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USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 124, F-104D A--ETC(U)

AUG 79 R G POWELL

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The USAF F-104D is a day/night fighter powered by a J79-GE-7/A turbojet engine. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating on a concrete runup pad for three engine/power configurations. Near-field data are reported for sixteen locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted		

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sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 19 locations are normalized to standard meteorological conditions and extrapolated from 75-8000 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distances from the source. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application", AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing definitions of quantities, symbols, equations, applications, limitations, etc.

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723107, Technology to Define and Assess Environmental Quality of Noise from AF Operations and 723108 Crew Safety in Operational Noise Environments.

The author gratefully acknowledges Mr. John Cole for his assistance in preparing this report, Col Justus Rose and Mr. Robert England for their assistance in acquiring the raw data, Mr. Keith Kettler, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton for assistance in the mechanics of data processing, and Mrs. Peggy Massie for assistance in typing and preparation of the graphics.

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INTRODUCTION

The USAF F-104D is a day/night fighter aircraft powered by a J79-GE-7/A turbojet. The aircraft was manufactured by the Lockheed Aircraft Corporation and the engine by the General Electric Company.

This volume provides measured and extrapolated data defining bioacoustic environments produced by this aircraft during ground runup operations. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with ground runups of the F-104D aircraft.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type, noise data in the handbook describe the noise produced during *ground operations* of aircraft, ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Volume 2 provides a method and data for adjusting the handbook's far-field noise data, which are for standard meteorological conditions (15°C temperature, 70% rel humidity, 0.760 meters Hg barometric pressure), to derive comparable data for other meteorological conditions. Refer to *Volumes 1 and 2* (references 1 and 2) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of each updated index.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL/BBE, Wright-Patterson AFB, OH 45433; AUTOVON 78-53675 or 78-53664; Commercial (513) 255-3675 or (513) 255-3664.

1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook Volume 1: Organization, Content and Application*, AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.
2. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 2: Procedure to Evaluate Effects of Non-standard Meteorological Conditions on Far-Field Noise*, AMRL-TR-75-50 (2), AMRL, WPAFB, OH, 1975.

NEAR-FIELD NOISE

MEASUREMENTS

AMRL acquired near-field noise data on the F-104D aircraft during ground runup operations of its turbojet engine. For these tests the aircraft was located on a concrete runup pad at Eglin AFB with no significant reflecting surfaces in the vicinity except the ground plane. Table 1 gives the surface meteorological conditions and the seven engine/power conditions. The ground-crew chief selected power conditions and near-field locations generally used during routine maintenance or engine runup for pre-flight checks.

At each near-field location a test engineer randomly moved a hand-held microphone in and around each location, probing all areas where a crew member's head would normally be located. He recorded all the noise samples on magnetic tape. During analysis of each sample, he determined the octave band root-mean-square sound pressure using a -4 or 8-second integration time to derive a power-averaged level for each location.

Figure 1 shows the sixteen near-field locations where ground crews are usually located for maintenance and/or preflight checkout operations. Estimates of noise levels at other locations are difficult in the near-field since the noise source is spatially distributed i.e., not a point source. The noise levels at near-field locations can vary widely depending upon relative distances from each noise source (intake noise, exhaust noise, panel resonances, internal engine noise through the engine wall, etc).

Table 1 lists the numeric/alphabetic designators used on the data pages in this report to identify the measurement locations and test conditions. For example, the designator 1/A means ground crew location 1 and test condition A.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the F-104D aircraft at the sixteen ground crew locations. This table includes the overall, 1/3 octave band, and octave band levels. From these data one can calculate the variety of measures given in Table 3, which are widely used to assess the effects of noise on personnel and their performance.

All near-field data are for the meteorological conditions at the time of test but are valid for all typical airbase meteorology because of the short sound propagation distances involved.

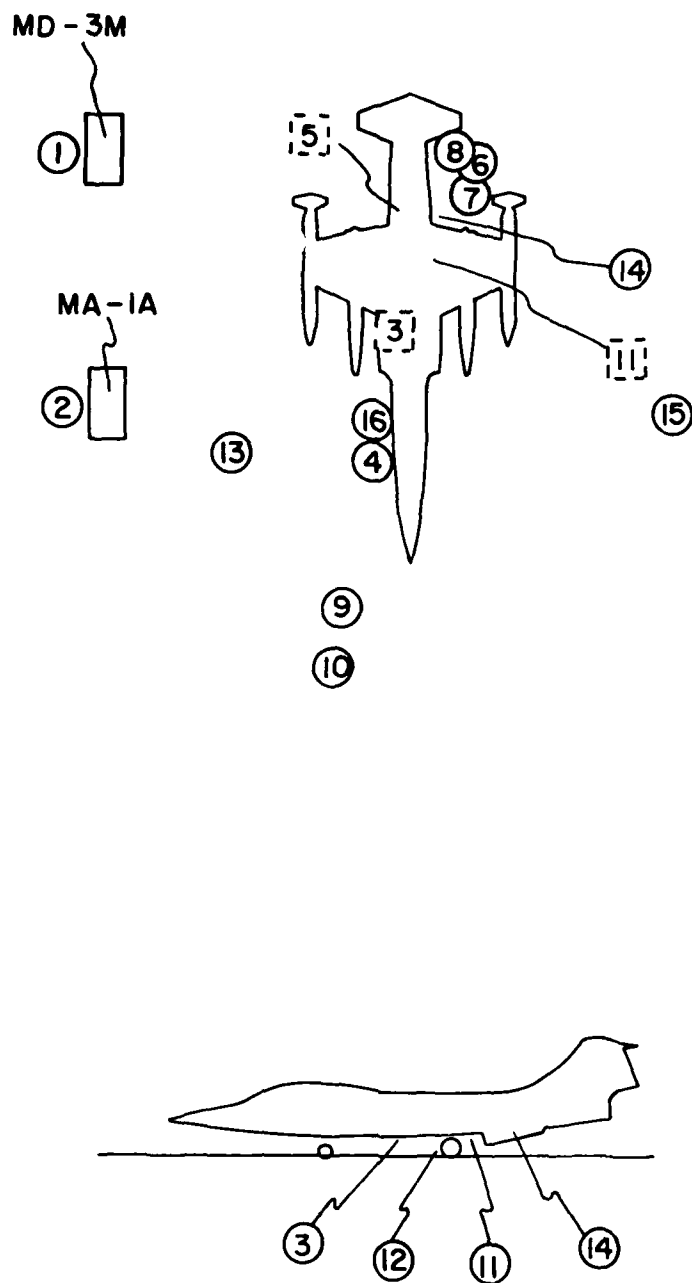


Figure 1. Near-Field Measurement Locations at
Trim Pad Eglin AFB FL

TABLE 1
MEASUREMENT LOCATIONS AND TEST CONDITIONS
FOR NEAR-FIELD NOISE MEASUREMENTS

F-104D Aircraft, Ground Runup, Eglin AFB
12 Aug 71
Tail # 071323

Ground Crew Location

1	Operator MD-3M
2	Operator MA-1A
3	Air Hose Removal
4	Crew Chief Ladder
5	Leak Check
6	Air Brake Check
7	Flap Check
8	Aileron Check
9	Marshall
10	Marshall
11	LG Compartment Check
12	Wheel Chock Pull
13	Trim Personnel
14	Trim Adjustment
15	Trim Personnel
16	Panel Check

Aircraft Engine Operation

A	MD-3M Operating
B	MD-3M and MA-1A Operating
C	Idle Power, MD-3M and MA-1A Operating
D	Idle Power
E	80% RPM Power
F	Military Power
G	Afterburner Power

Meterology

Temperature	23.9 C
Bar Pressure	0.769 M Hg
Rel Humidity	90%
Wind	
—Speed	3.1 M/Sec (6 Kt)
—Direction	350 Deg

FAR-FIELD NOISE

MEASUREMENTS

AMRL acquired far-field data during two 1-hour test periods at Eglin AFB. Figure 2 shows the ground runup pads, ground cover, aircraft orientation and the microphone measurement sites on each semi-circle. The centers of the 50 and 75 meter radius semi-circles used in surveying the J79-GE-7/A engine were on the ground directly below the intersection of the aircraft's centerline and the plane passing through the exhaust-nozzle's exit.

The ground runup pad (Hot Cargo Pad) used for the idle and military power measurements did not have a blast deflector, therefore, the jet exhaust was in a "free-flow" condition. However the trim pad used for the afterburner power measurements did have a blast deflector installed as part of the facility. In this case the aircraft was placed on a long tie-down cable so that the distance between the exhaust nozzle and the deflector was 52 meters. At this distance there was minimal interaction between the noise source and the blast deflector so that the afterburner noise measurements acquired at 50 meters were essentially in a "free-flow" condition and should be used as such.

Table 4 provides cockpit readout of the engines RPM for each setting used in far-field tests. Also listed in this table are the surface meteorological conditions during data acquisition.

All microphone measurement sites are in the acoustic far-field of the source where the sound wave fronts spherically diverge and the noise source may be regarded as a point source.

Test personnel acquired far-field noise data at Eglin AFB by using a hand-held microphone (1.7 meters / 5½ feet above the ground plane and pointed at the noise source. 0° incidence) and sequentially recording 5-10 seconds of data at each far-field location on a portable microphone/tape recorder system. The samples were then time-integrated to derive a root-mean-square sound pressure level.

RESULTS

Table 5 lists the overall and 1/3 octave band SPL measured at the far-field locations under meteorological conditions at the time of the test. Data in all other figures and tables are based on these levels. These data were normalized to 100 meters distance and standard meteorological conditions (15°C temperature, 70% relative humidity, 0.760 meter Hg barometric pressure) and used to derive the graphic data in Figure 3 which provides a compact summary of the far-field noise characteristics of the F-104D aircraft in a standard format.

Figure 4 and Table 6 present two basic acoustic measures, the acoustic power levels and the directivity index, respectively. The acoustic power level describes the power radiated by the source as a function of frequency. The directivity index is a standard acoustical engineering measure that describes the geometric way in which the source radiates this power as a function of both frequency and angle from source. These basic source measures are primarily of interest for acoustical engineers and noise generation/control specialists.

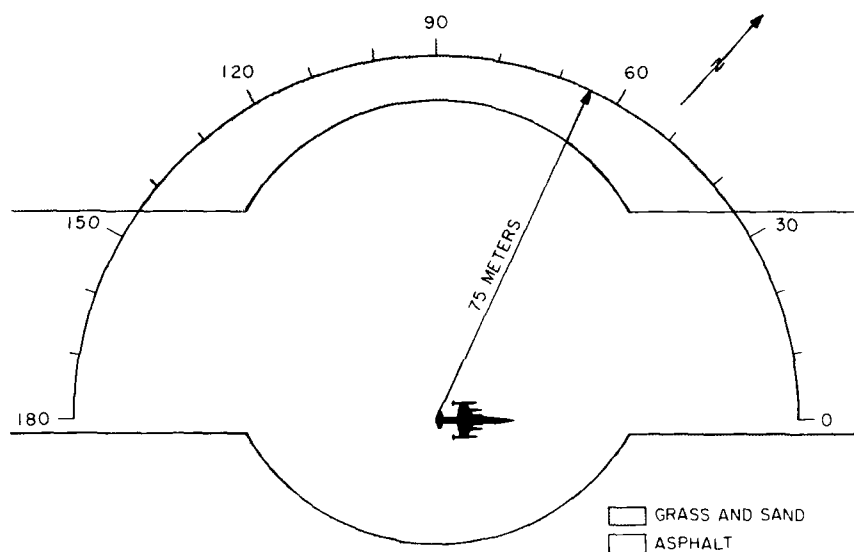


Figure 2(a). Far-Field Measurement Locations at the Hot Cargo Pad, Eglin AFB FL

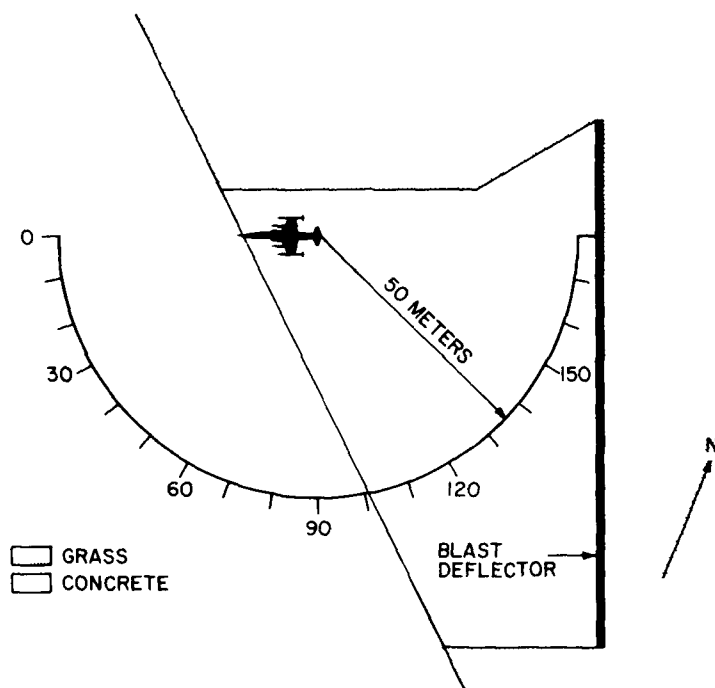


Figure 2(b). Far-Field Measurement Locations at Trim Pad Eglin AFB FL

Estimates of noise levels for intermediate power conditions (e.g., 88% engine RPM) can be determined as explained in Volume 1 of this handbook.

Figures 5 through 11 are sets of equal noise contours describing seven different measures of noise as a function of angle and distance from the source for standard day meteorology. They are, respectively, overall sound pressure level, C-weighted sound level, A-weighted sound level, perceived noise level, speech interference level, permissible exposure times for personnel and octave band sound pressure levels.

Data excessively influenced by spurious background/electronic noise were eliminated from all figures and tables. No data are presented at the 180 degree location for the military power setting and at the 170, and 180 degree locations for the afterburner power setting because of turbulent air flow behind the aircraft. Typically, the A-weighted levels for these angles are 10 to 20 dBA below the level measured at the preceding microphone location.

Test personnel performed noise surveys during quiet periods when the background noise was minimal, e.g., early in the morning when no other aircraft or engine test stands were operating. Data eliminated because they were near the background/electronic noise were generally not significant because the levels were so low (e.g., Table 5 at idle power).

Volume 2 of the handbook describes the influence of meteorology on far-field noise environments, and provides, if required, the factors necessary to adjust the handbook's standard meteorological day data.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB) 1/3 OCTAVE BAND													IDENTIFICATION:			
2																
NOISE SOURCE/SUBJECT: (OPERATION:)													OMEGA 3.2			
F-104D AIRCRAFT ()													TEST 71-019-105			
GROUND CREW ()													RUN 01			
NEAR FIELD NOISE LEVELS ()													18 JAN 79			
													PAGE F1			
													LOCATION/CONDITION			
FREQ (HZ)	1/A	2/B	2/C	3/D	4/B	4/D	5/D	6/D	7/E	8/D	9/D	10/D	11/D	12/D		
25	77	79	80	93	75	85	89	92	94	98	81	77	87	91		
31.5	81	84	84	110	76	95	103	100	96	108	90	86	102	105		
40	89	84	87	113	78	99	107	109	103	110	94	91	112	113		
50	91	86	87	112	72	91	108	112	110	107	97	88	113	112		
63	90	88	89	97	75	84	93	99	103	94	87	81	100	100		
80	92	85	89	96	81	93	93	93	100	95	86	84	96	97		
100	110	100	100	94	97	87	93	98	101	92	88	83	93	97		
125	108	99	99	98	97	84	94	94	97	94	88	82	95	102		
160	104	97	100	100	96	84	92	97	94	97	87	84	95	99		
200	105	92	96	89	90	85	85	103	94	94	82	80	91	92		
250	105	91	92	88	91	90	83	96	97	96	83	78	88	87		
315	95	92	92	91	90	90	87	93	97	96	88	79	92	89		
400	93	92	93	95	93	94	90	94	94	94	91	83	96	94		
500	94	89	93	94	89	106	89	93	94	93	104	90	100	96		
630	92	88	89	98	86	110	91	90	94	91	102	89	101	98		
800	92	85	88	89	80	97	86	90	95	90	91	83	91	90		
1000	92	83	84	89	79	95	86	88	96	89	92	87	90	88		
1250	87	85	87	90	79	97	87	89	98	89	93	87	90	89		
1600	89	90	90	95	82	105	91	89	103	90	97	90	97	94		
2000	87	92	91	96	83	102	92	93	107	89	97	88	97	96		
2500	84	94	91	96	85	100	90	89	110	87	101	89	98	97		
3150	83	93	93	92	87	95	88	87	112	86	94	86	94	91		
4000	82	95	94	92	88	93	89	87	114	87	94	86	94	91		
5000	78	95	94	89	87	91	92	88	116	87	92	84	93	91		
6300	76	102	96	86	88	91	87	85	119	89	91	85	91	88		
8000	74	116	106	87	93	90	91	84	120	78	91	85	91	90		
10000	70	110	107	89	94	86	96	84	118	85	87	84	92	94		
OVERALL	114	117	112	117	105	113	112	115	125	114	110	100	116	117		

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATION:			
2	1/3 OCTAVE BAND				
NOISE SOURCE/SUBJECT:		TEST 71-019-105			
(OPERATION:		RUN 02			
F-104D AIRCRAFT		18 JAN 79			
GROUND CREW		PAGE F2			
NEAR FIELD NOISE LEVELS					
		LOCATION/CONDITION			
FREQ (HZ)	13/F	14/E	15/E	15/G	16/D
25	90	107	81	103	86
31.5	92	110	86	103	98
40	94	115	90	106	103
50	96	119	95	105	103
63	97	117	94	107	89
80	99	116	94	110	85
100	99	121	96	112	90
125	103	122	92	114	91
160	106	120	93	116	91
200	104	115	94	114	83
250	103	111	91	112	82
315	105	118	88	112	84
400	105	118	90	111	88
500	109	113	86	111	98
630	111	110	86	116	93
800	115	110	85	119	87
1000	115	110	83	119	87
1250	111	110	81	117	87
1600	110	112	82	117	96
2000	109	117	86	117	94
2500	107	116	87	117	97
3150	105	114	86	114	91
4000	105	116	88	114	91
5000	102	115	85	111	87
6300	101	114	84	110	85
8000	99	112	82	107	84
10000	97	114	79	103	81
OVERALL	122	130	104	128	109
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE					

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)												
2 OCTAVE BAND												
NOISE SOURCE/SUBJECT: (OPERATION:) IDENTIFICATION:)												
F-104D AIRCRAFT () OMEGA 3.2												
GROUND CREW () TEST 71-019-105												
NEAR FIELD NOISE LEVELS () RUN 01												
() 18 JAN 79												
() PAGE J1												
LOCATION/CONDITION												
FREQ (HZ)	1/A	2/B	2/C	3/D	4/B	4/D	5/D	6/D	7/E	8/D	9/D	10/D 11/D 12/D
31.5	89	88	89	115	81	100	108	110	104	112	95	92 112 114
63	96	91	93	112	83	96	108	112	111	107	97	90 113 112
125	112	103	104	103	102	90	98	101	103	99	92	88 99 105
250	108	96	99	94	95	93	90	104	101	100	90	84 95 94
500	98	94	97	101	95	111	95	97	99	98	106	93 104 101
1000	96	89	91	94	84	101	91	94	101	94	97	90 95 94
2000	92	97	95	100	88	107	95	95	112	94	104	93 102 100
4000	86	99	98	96	92	98	95	92	119	91	98	90 98 96
8000	79	117	110	92	97	94	98	89	124	92	95	89 96 96
OVERALL	114	117	112	117	105	113	112	115	125	114	110	100 116 117

TABLE: MEASURED SOUND PRESSURE LEVEL (09)		IDENTIFICATION:	
OCTAVE BAND			
2		OMEGA 3.2	
		TEST 71-019-105	
NOISE SOURCE/SUBJECT:		RUN 02	
F-104D AIRCRAFT		18 JAN 79	
GROUND CREW			
NEAR FIELD NOISE LEVELS		PAGE J2	
		LOCATION/CONDITION	

TABLE: MEASURES OF HUMAN NOISE EXPOSURE														IDENTIFICATION:	
3														OMEGA 3.2	
NOISE SOURCE/SUBJECT: (OPERATION:)														TEST 71-019-105	
F-104D AIRCRAFT ()														RUN 01	
GROUND CREW ()														18 JAN 79	
NEAR FIELD NOISE LEVELS ()														PAGE H1	
LOCATION/CONDITION															
1/A 2/B 2/C 3/D 4/B 4/D 5/D 6/D 7/E 8/D 9/D 10/D 11/D 12/D															
HAZARD/PROTECTION															
G-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DB) AT EAR															
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DB) AT EAR															
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)															
NO PROTECTION															
OASLC	114	115	109	115	104	113	110	113	123	112	109	99	115	115	
OASLA	103	116	109	105	99	112	102	102	125	101	108	98	107	105	
T	18	P	6	13	36	3.8	21	21	P	25	8	42	9	13	
MINIMUM QPL EAR MUFFS															
OASLA*	92	92	88	87	82	88	83	87	100	84	84	74	87	88	
T	120	120	240	285	679	240	571	285	30	480	480	960	285	240	
AMERICAN OPTICAL 1700 EAR MUFFS															
OASLA*	88	90	84	85	77	82	81	84	95	82	78	69	85	85	
T	246	170	480	404	960	679	807	480	71	679	960	960	404	404	
V-51R EAR PLUGS															
OASLA*	81	86	81	80	74	87	76	79	94	78	82	71	82	80	
T	807	339	807	960	960	285	960	960	85	960	679	960	679	960	
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS															
OASLA*	69	76	70	70	61	72	65	68	84	67	68	58	70	70	
T	960	960	960	960	960	960	960	960	480	960	960	960	960	960	
H-133 GROUND COMMUNICATION UNIT															
OASLA*	81	86	80	82	72	83	77	80	95	78	80	71	82	82	
T	807	339	960	679	960	571	960	960	71	960	960	960	679	679	
COMMUNICATION															
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)															
PSIL	95	93	95	98	89	107	94	95	104	95	102	92	100	98	
ANNOYANCE															
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)															
TONE CORRECTION (C IN DB)															
PNLT	119	130	124	122	115	126	118	118	137	116	124	113	123	122	
C	2	2	1	2	1	3	1	1	0	0	2	1	2	2	

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.
P ADDITIONAL EAR PROTECTION REQUIRED.

TABLE: MEASURES OF HUMAN NOISE EXPOSURE										IDENTIFICATION:	
3											
NOISE SOURCE/SUBJECT:										OMEGA 3.2	
(OPERATION:										TEST 71-019-105	
(										RUN 02	
F-104D AIRCRAFT										(
((
GROUND CREW										(
((
NEAR FIELD NOISE LEVELS										18 JAN 79	
((
(										PAGE H2	
LOCATION/CONDITION											
13/F 14/E 15/E 15/G 16/D											
HAZARD/PROTECTION											
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DB) AT EAR											
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DB) AT EAR											
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)											
NO PROTECTION											
OASLC											
OASLA											
T											
MINIMUM QPL EAR MUFFS											
OASLA*											
T											
AMERICAN OPTICAL 1700 EAR MUFFS											
OASLA*											
T											
V-51R EAR PLUGS											
OASLA*											
T											
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS											
OASLA*											
T											
H-133 GROUND COMMUNICATION UNIT											
OASLA*											
T											
COMMUNICATION											
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)											
PSIL											
115 118 90 121 97											
ANNOYANCE											
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)											
TONE CORRECTION (C IN DB)											
PNLT											
C											
132 142 114 140 121											
0 1 1 0 2											

TABLE 4
TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

F-104D Aircraft, Ground Runups
 Eglin AFB FL, 2 August 1971, Tail # 071323
 Eglin AFB FL, 12 August 1971, Tail # 071323

Aircraft Engine Operation

Idle	67 % RPM, Core Speed
Military	100 % RPM, NC
Afterburner	100 % RPM, NC

Meteorology

Idle and Military	Temperature	27.8 C
	Bar Pressure	0.761 M Hg
	Rel Humidity	73 %
	Wind — Speed	2.6 M/SEC (5 KTS)
	— Direction	170 Deg
Afterburner	Temperature	23.9 C
	Bar Pressure	0.769 M Hg
	Rel Humidity	90 %
	Wind — Speed	3.1 M/SEC (6 KTS)
	— Direction	350 Deg

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																		
1/3 OCTAVE BAND																		
DISTANCE = 75 METERS																		
5																		
NOISE SOURCE/SUBJECT: (OPERATION:)																		
F-104D AIRCRAFT (MILITARY POWER)																		
J79-GE-7/A ENGINE (100% RPM)																		
FAR FIELD NOISE (FREE FLOW)																		
FREQ (HZ) 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180																		
ANGLE (DEGREES)																		
25	74<	76<	77	76<	77<	79	80	79	83	85	86	86	90	93	97	100	100	97
31.5	78	77<	78	79	79	81	81	81	85	86	88	89	91	95	102	102	102	95
46	80	79	81	79	81	81	83	84	86	85	88	91	95	99	103	106	106	95
50	79	79	80	80	81	81	83	85	87	89	90	90	96	102	107	108	105	90
63	81	82	81	83	86	84	87	87	89	90	93	94	103	104	110	113	107	90
80	83	83	84	84	85	86	88	89	91	93	94	96	103	107	113	115	109	92
100	85	85	86	87	88	88	90	91	93	95	97	99	106	111	115	120	112	94
125	86	87	89	89	90	90	92	94	95	97	99	101	108	114	115	121	115	92
160	90	91	91	91	93	92	95	95	97	99	101	104	111	118	117	121	118	94
200	89	90	91	90	92	90	93	95	96	98	100	104	110	117	117	115	115	91
250	87	87	88	88	91	91	91	92	95	97	99	102	108	114	118	113	115	91
315	82	89	91	91	90	92	93	94	96	98	101	104	111	117	119	121	117	91
400	87	93	94	93	93	94	95	98	99	101	103	108	112	117	121	121	117	87
500	88	89	92	93	97	95	96	99	101	102	104	108	111	115	119	116	113	85
630	87	88	92	93	94	93	93	96	97	99	102	105	113	112	117	117	114	85
800	90	90	95	95	99	97	97	100	101	103	104	107	109	112	114	113	111	82
1000	85	87	93	94	98	97	95	98	99	100	102	104	108	109	114	113	110	81
1250	80	84	90	91	95	95	94	99	99	100	101	102	104	105	109	108	105	78
1600	79	82	89	91	95	95	94	100	101	103	104	104	104	104	109	106	101	78
2000	76	79	87	89	93	95	93	99	100	102	104	103	101	103	107	104	99	77
2500	75	78	86	87	92	92	91	98	99	102	103	102	100	101	106	105	100	75
3150	68	73	81	84	89	88	87	95	97	98	100	97	98	100	102	105	99	72
4000	67	72	81	83	88	87	87	95	96	98	99	97	99	100	102	104	99	71
5000	64	70	78	80	85	85	84	92	93	95	96	94	97	97	100	99	93	68
6300	62	69	77	78	83	83	83	91	91	93	94	93	95	95	98	99	90	67
8000	61	69	76	76	82	82	81	89	89	91	92	92	93	95	98	98	88	65
10000	61	67	73	73	78	78	78	84	85	87	89	89	91	92	96	96	85	61
OVERALL	98	100	103	103	106	106	106	110	111	113	114	116	121	126	128	129	126	104

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																
1/3 OCTAVE BAND																
DISTANCE = 50 METERS																
NOISE SOURCE/SUBJECT:																
OPERATION:																
AFTERBURNER POWER																
100% RPM																
DEFLECTED FLOW																
METEOROLOGY:																
TEMP = 24 C																
BAR PRESS = .758 M HG																
REL HUMID = 90 %																
PAGE 2																
IDENTIFICATION:																
OMEGA 1.4																
TEST 75-002-060																
RUN 03																
FREQ (HZ)																
ANGLE (DEGREES)																
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180																
25	90	91	91	90	92	92	92	94	96	95	100	102	107	111	114	109
31.5	94	95	93	94	95	95	94	97	97	99	102	106	113	116	116	111
40	95	97	95	95	97	97	97	98	100	101	104	109	116	119	121	112
50	94	96	95	96	96	99	98	99	100	101	102	105	110	119	122	109
63	97	99	97	98	98	99	99	100	101	102	104	105	107	113	123	110
80	99	101	99	100	100	102	102	102	104	105	106	110	116	126	128	112
100	101	102	103	103	103	104	104	106	106	108	109	113	120	130	131	114
125	104	106	105	104	104	105	106	106	108	110	111	114	118	129	132	113
160	105	106	107	106	107	108	107	109	109	111	114	118	123	129	132	113
200	103	104	105	104	104	106	105	106	108	109	113	117	124	127	128	110
250	104	104	103	104	105	106	105	107	110	112	115	118	126	131	125	108
315	101	104	105	107	108	109	108	110	111	113	117	121	126	133	128	107
400	99	104	108	106	107	107	108	109	109	111	115	120	125	128	127	103
500	98	102	104	103	105	105	106	108	111	112	114	120	124	129	124	103
630	101	103	105	106	107	106	109	110	110	112	114	121	125	127	125	102
800	97	98	101	101	103	103	104	105	107	107	110	117	121	124	120	99
1000	95	97	100	99	103	105	103	104	104	104	111	115	120	121	119	98
1250	94	95	98	97	101	108	101	101	100	103	114	113	118	119	115	97
1600	93	95	98	99	99	108	102	101	104	109	116	113	118	118	115	109
2000	94	97	101	101	99	107	105	108	109	113	116	115	116	117	114	95
2500	95	97	102	100	99	105	106	110	109	112	113	114	112	115	112	92
3150	90	93	97	97	98	104	105	106	107	109	112	113	112	115	112	106
4000	87	91	94	94	95	101	103	102	103	106	110	110	112	113	109	104
5000	85	88	92	92	92	98	99	100	101	105	108	108	110	111	107	101
6300	84	86	90	90	91	97	99	99	101	104	107	108	110	111	107	101
8000	81	84	88	88	88	95	96	97	99	101	105	105	109	109	105	83
10000	81	83	87	87	87	93	96	96	98	101	105	106	109	110	105	82
OVERALL	113	114	116	116	116	119	118	120	121	123	126	130	134	140	139	122

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

FIGURE: NORMALIZED FARFIELD NOISE LEVELS

3
DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT:

F-104D AIRCRAFT

J79-GE-7/A ENGINE

FAR FIELD NOISE

NOISE SOURCE/SUBJECT: { OPERATION:

F-1040	AIRCRAFT	IOLE POWER
--------	----------	------------

J79-GE-7/A ENGINE 1 67% RPM

FAR FIELD NOISE (FREE FLOW

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:

F-1040 AIRCRAFT (IOLE POWER) BAR PRESS =

J79-GE-7/A ENGINE (67% RPM) REL HUMID = 70 %

FAR FIELD NOISE (FREE FLOW)

```
NOISE SOURCE/SUBJECT:      ( OPERATION:      ) METEOROLOGY:      ) RUN 01
```

F-104D AIRCRAFT (IOLE POWER) BAR PRESS = .760 M HG) 10 SEP 70

J79-GE-77A ENGINE

FAR FIELD NOISE (FREE FLOW) PAGE 8

F-104D AIRCRAFT (IOLE POWER) BAR PRESS = .760 M HG) 10 SEP 78

J79-GE-7/A ENGINE
(67% RPM
) REL HUMID = 70 %
)
)

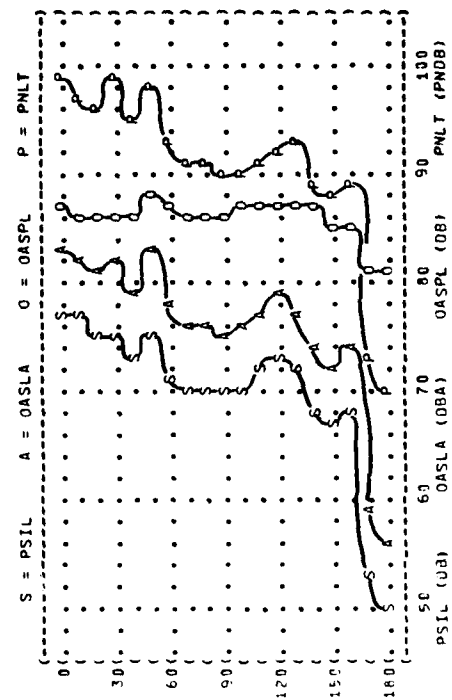
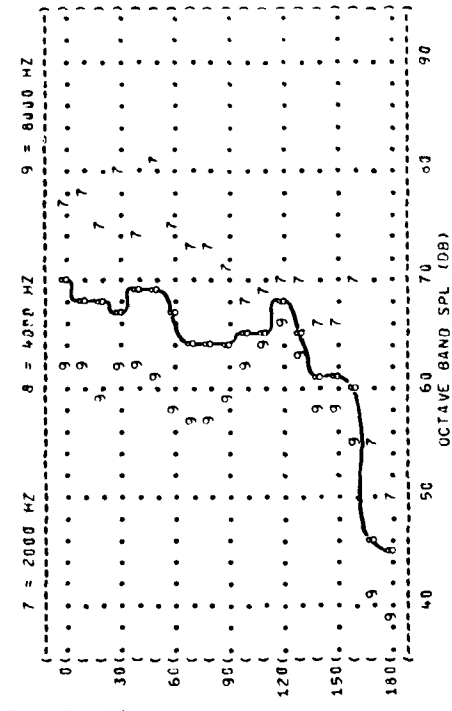
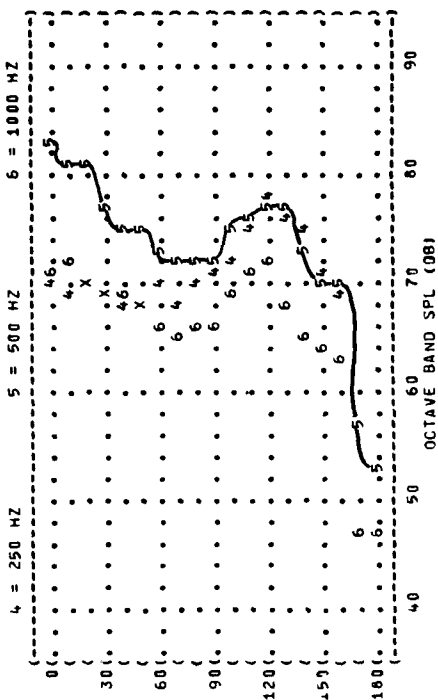
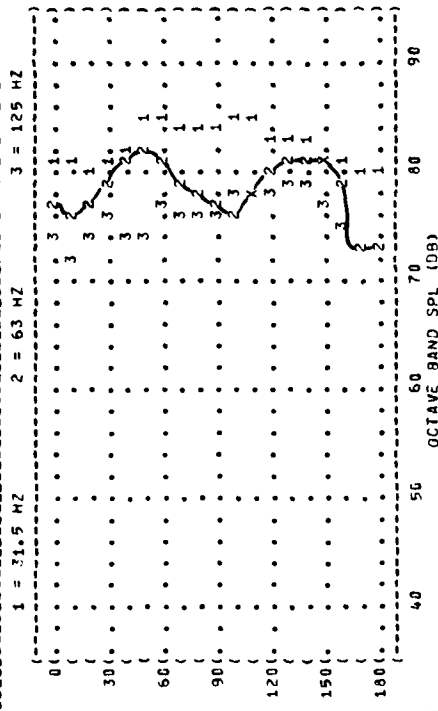


Figure 1 consists of two vertically stacked plots. Both plots show the variation of the ratio of the maximum to the minimum value of the normalized power spectrum (Y-axis, 0 to 180) versus Octave Band SPL (dB) (X-axis, 70 to 120). The top plot is for a 2000 Hz carrier wave, and the bottom plot is for a 4000 Hz carrier wave. The curves show a general increase in the ratio with increasing SPL, with some fluctuations. The 4000 Hz curve shows more pronounced peaks and valleys than the 2000 Hz curve.

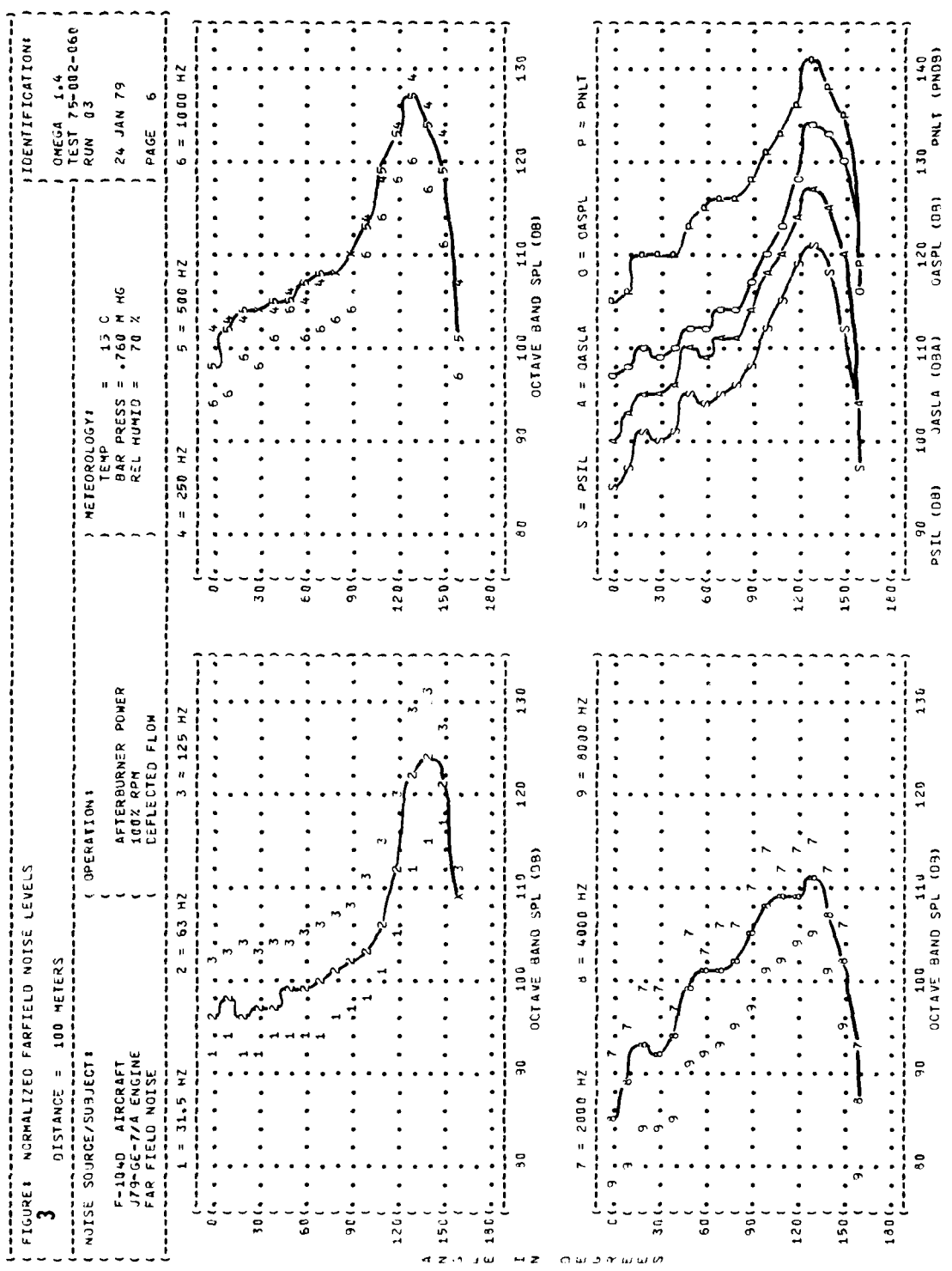


FIGURE 4: ACOUSTIC POWER LEVEL (PWL)

IDENTIFICATION: OMEGA 1.4
 TEST 75-002-033
 RUN 01

NOISE SOURCE/SUBJECT: F-1040 AIRCRAFT
 J79-GE-7/A ENGINE
 FAR FIELD NOISE

OPERATION: IDLE POWER
 67% RPM
 FREE FLOW

METEOROLOGY: TEMP = 28 C
 BAR PRESS = .761 M HG
 REL HUMID = 73 %

PAGE 3

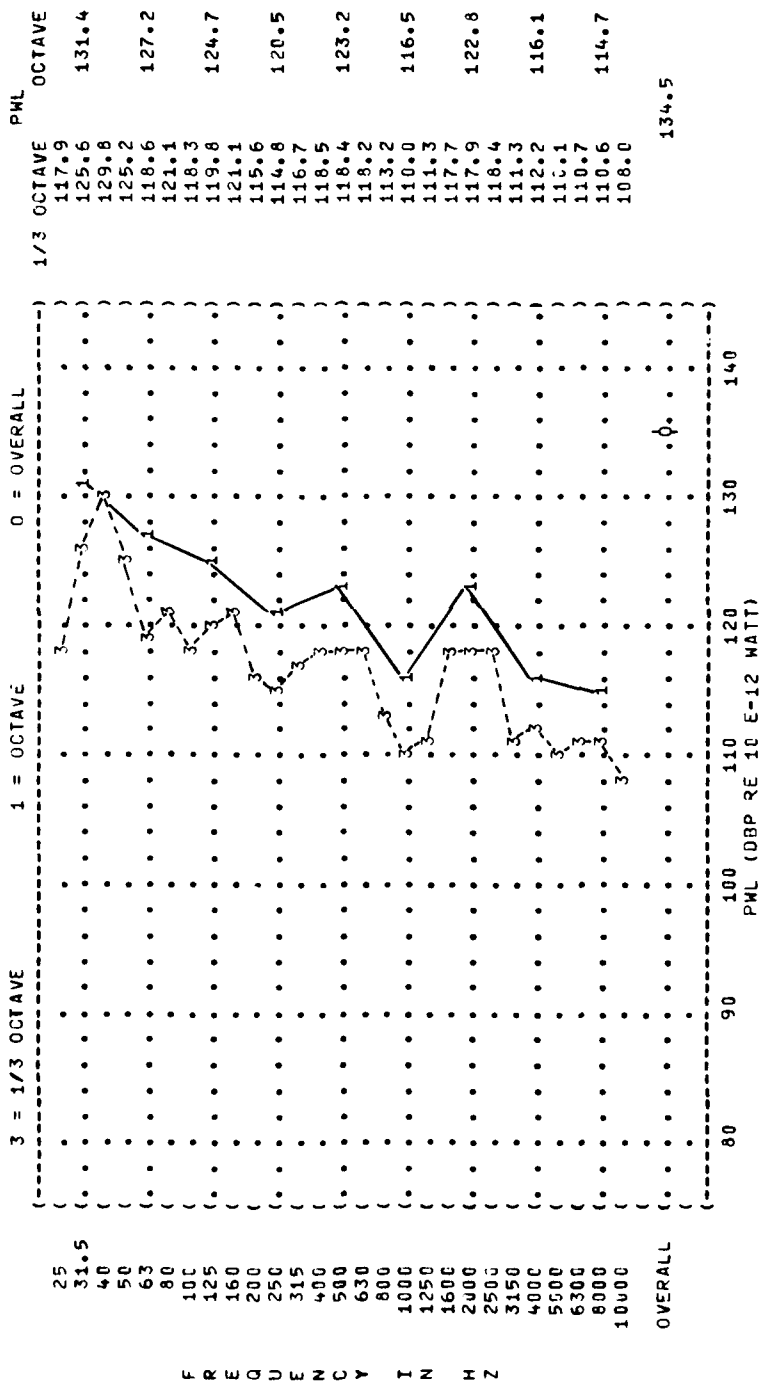


FIGURE: ACOUSTIC POWER LEVEL (PWL)

4

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY: TEMP = 28 C
 F-104D AIRCRAFT (MILITARY POWER)
 J79-GE-7/A ENGINE (100% RPM) BAR PRESS = .761 M HG
 FAR FIELD NOISE (FREE FLOW) REL HUMID = 73 %

IDENTIFICATION:)
) OMEGA 1.4
) TEST 75-002-033
) RUN 03
) 18 SEP 78
) PAGE 3

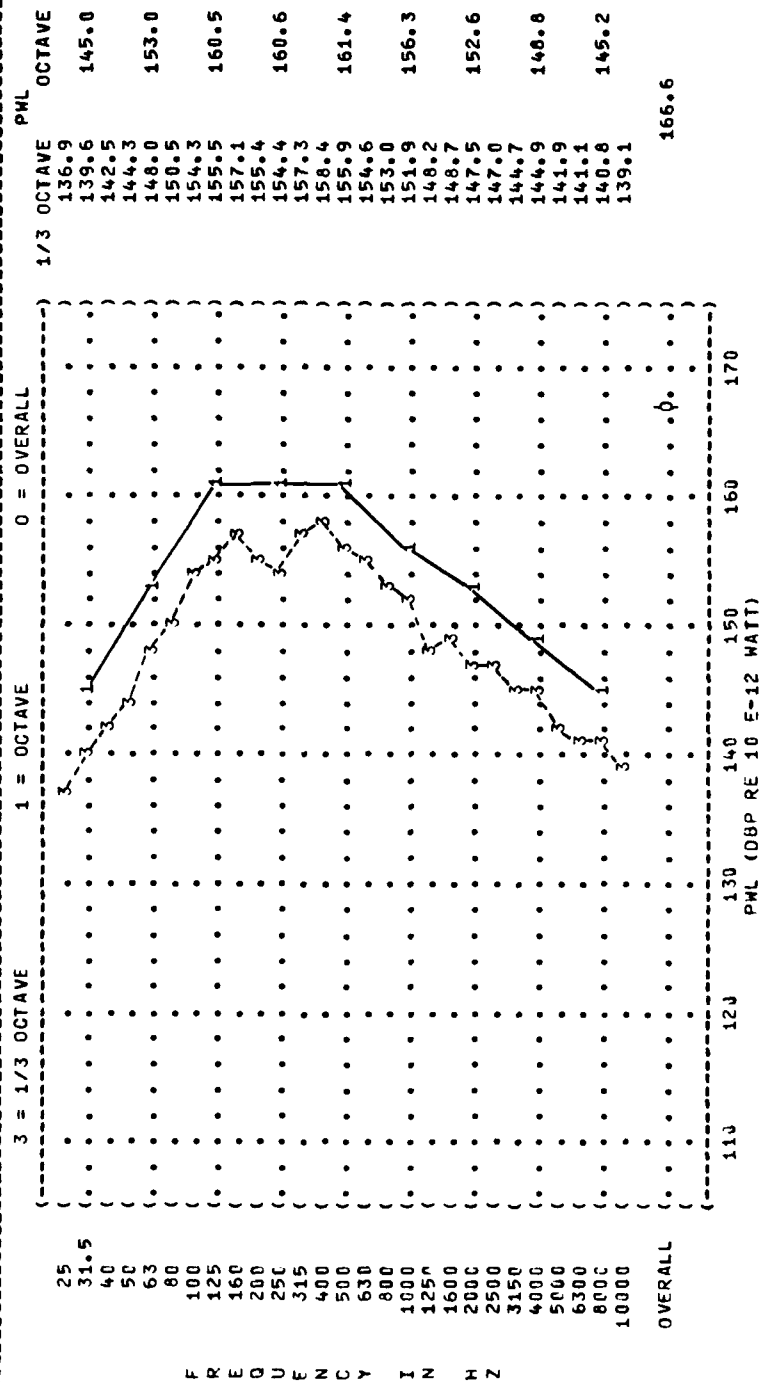


FIGURE: ACOUSTIC POWER LEVEL (PWL)

4

IDENTIFICATION:

OMEGA 1.4

TEST 75-002-060

RUN 03

24 JAN 79

PAGE 3

NOISE SOURCE/SUBJECT:

OPERATION:

METEOROLOGY:

TEMP = 24 C

AFTERBURNER POWER

BAR PRESS = .758 M HG

100% RPM

REL HUMID = 90 %

DEFLECTED FLOW

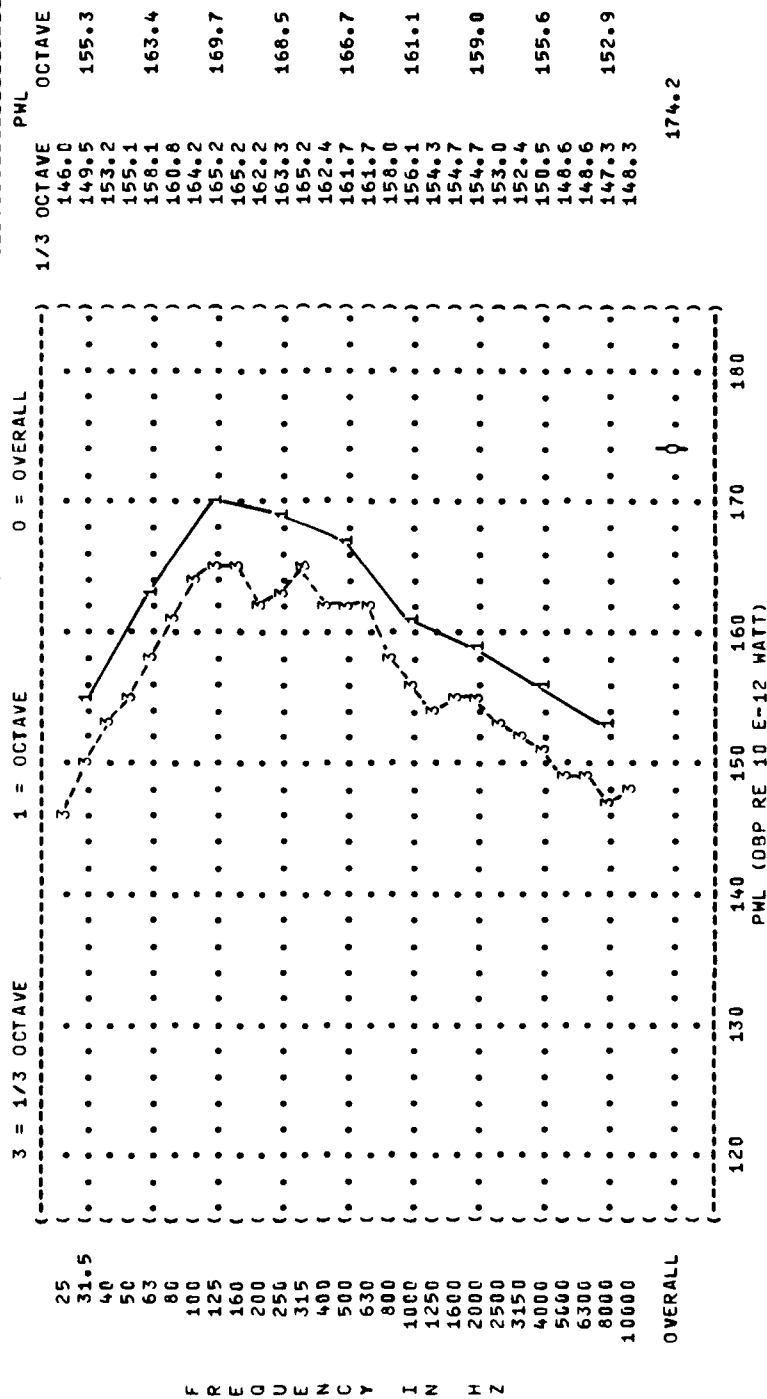


TABLE: DIRECTIVITY INDEX (DB)																	IDENTIFICATION:		
6																	OMEGA 1.4		
NOISE SOURCE/SUBJECT:																	TEST 75-002-033		
(																	) RUN 01		
()		
()		
(																	) 18 SEP 78		
(																	) PAGE 4		
()		
F-104D AIRCRAFT																			
J79-GE-7/A ENGINE																			
FAR FIELD NOISE																			
METEOROLOGY:																			
TEMP = 28 C																			
BAR PRESS = .761 M HG																			
REL HUMID = 73 %																			
ANGLE (DEGREES)																			
FREQ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
(HZ)																			
1/3 OCTAVE																			
25	-2	-4	-5	-6	-6	-2	6	-1	-3	-1	1	-1	-2	0	1	-1	0	0	0
31.5	-3	-4	-3	-2	-2	0	0	0	0	1	1	2	0	-1	0	-2	-2	-3	-3
40	-2	-3	-4	-2	-1	2	1	1	1	1	1	2	-1	-1	-1	-3	-2	-5	-4
50	-2	-2	-2	0	2	3	1	0	-2	-3	-4	-2	0	1	2	0	-1	-6	-6
63	-3	-5	-3	-2	1	1	2	-2	-3	-3	-1	0	2	2	3	1	0	-4	-6
80	-5	-5	-3	-1	0	0	1	-2	-6	-1	-3	-1	1	1	2	4	2	-10	-9
100	-1	-4	-3	-1	-1	-1	2	-2	-2	0	0	-1	1	2	2	3	0		
125	-3	-4	-4	0	-4	-5	0	0	1	-1	1	2	2	2	1	1	0	-5	
160	-3	-5	-2	-2	-5	-3	0	-1	-1	-1	1	2	4	3	1	-2	-2		
200	-1	-4	-3	-3	-3	-3	0	-4	-1	-1	0	2	4	4	2	-2	-6		
250	-2	-4	-4	-4	-5	-4	-4	-4	-2	-2	-2	2	5	4	3	-2	-4		
315	-3	-4	-2	-4	-7	-6	-6	-6	-4	-3	-1	2	6	4	4	-2	-4		
400	-2	1	-1	-3	-4	-4	-6	-5	-3	-1	1	3	4	5	0	-4	-6	-20	-22
500	11	8	6	2	-2	-2	-2	-2	-2	-2	0	1	2	0	-3	-6	-5	-17	-24
630	5	7	9	4	3	2	-2	-2	-6	-7	-4	-2	-1	-4	-4	-7	-4	-17	-20
800	0	3	2	1	1	-3	-4	-4	-3	-3	0	2	5	2	-2	-3	-5	-22	-22
1000	5	4	1	1	0	0	-2	-3	-1	-2	0	3	3	-1	-4	-5	-20	-20	
1250	4	4	3	1	1	2	-2	-2	-2	-1	0	4	1	-4	-5	-6	-5	-22	-23
1600	2	3	0	2	1	7	2	0	0	-3	-6	-4	-3	-3	-7	-7	-2	-18	-24
2000	3	2	-1	5	0	7	1	-1	-1	-3	-6	-5	-4	-4	-7	-8	-4	-19	-24
2500	5	5	2	8	1	7	-1	-3	-5	-4	-6	-7	-5	-7	-11	-8	-9	-21	-23
3150	5	4	3	2	3	3	2	-1	-2	-1	-1	-1	1	-3	-6	-5	-6	-19	-20
4000	3	1	2	1	1	3	2	-2	-3	-2	0	-1	2	-1	-5	-5	-6	-20	-22
5000	2	1	-1	1	1	3	-2	-2	-3	-2	0	1	4	1	-4	-4	-7	-21	-23
6300	0	0	-2	0	1	0	-3	-4	-4	-2	1	3	5	2	-4	-4	-8	-22	-23
8000	1	0	-1	1	1	0	-3	-4	-5	-3	0	3	4	4	-3	-3	-6	-20	-22
10000	1	1	-2	1	2	0	-4	-5	-4	-2	2	3	3	1	-3	-1	-2	-18	-21
OCTAVE																			
31.5	-2	-3	-4	-2	-2	1	1	0	1	0	1	2	0	-1	-1	-2	-2	-4	-4
63	-2	-3	-3	0	2	2	1	-1	-1	-3	-3	-1	0	1	2	2	0	-6	-6
125	-2	-4	-3	-1	-3	-3	1	-1	0	-1	1	1	2	2	2	0	-2		
250	-2	-4	-3	-3	-5	-4	-2	-5	-3	-2	0	2	5	4	2	-2	-4		
500	0	6	6	2	0	0	-2	-3	-3	-2	0	1	2	2	-2	-5	-5	-18	-22
1000	3	4	2	1	1	0	-3	-3	-2	-2	0	3	3	0	-3	-4	-5	-21	-22
2000	4	4	1	6	1	7	1	-1	-1	-3	-6	-5	-4	-8	-8	-4	-4	-19	-24
4000	4	2	2	1	3	3	1	-2	-2	-2	0	-1	2	-1	-5	-5	-6	-20	-21
8000	1	0	-2	1	1	0	-3	-4	-4	-2	1	3	4	2	-3	-3	-6	-20	-22
OVERALL	0	-1	-1	0	-1	2	1	0	0	-1	1	1	1	0	0	-1	-2	-6	-6

TABLE: DIRECTIVITY INDEX (DB)										IDENTIFICATION:									
6										OMEGA 1.4									
NOISE SOURCE/SUBJECT:										TEST 75-002-033									
F-104D AIRCRAFT										RUN 93									
J79-GE-7/A ENGINE										18 SEP 78									
FAR FIELD NOISE										PAGE 4									
OPERATION:										METEOROLOGY:									
MILITARY POWER										TEMP = 2° C									
100% RPM										BAR PRESS = .761 M HG									
FREE FLOW										REL HUMID = 73 %									
FREQ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
(HZ)																			
1/3 OCTAVE																			
25	-18	-15	-14	-16	-15	-13	-12	-13	-8	-7	-6	-6	-2	1	6	9	8	6	
31.5	-17	-18	-16	-16	-15	-15	-13	-13	-9	-9	-6	-5	-3	1	8	8	8	1	
40	-18	-18	-17	-18	-16	-16	-14	-14	-12	-12	-9	-6	-2	2	6	9	9	-3	
50	-20	-20	-19	-19	-18	-18	-16	-14	-14	-12	-10	-9	-3	3	8	9	6	-9	
63	-22	-21	-21	-20	-17	-19	-16	-16	-14	-13	-10	-9	-3	2	7	10	5	-12	
80	-23	-22	-22	-21	-21	-19	-18	-16	-15	-13	-11	-9	-2	2	7	10	4	-14	
100	-24	-24	-23	-22	-21	-21	-19	-18	-16	-14	-12	-10	-3	2	6	11	3	-15	
125	-24	-23	-21	-21	-21	-20	-18	-16	-15	-13	-11	-9	-3	3	5	11	5	-19	
160	-22	-21	-21	-21	-19	-20	-17	-16	-15	-12	-11	-8	-1	6	5	9	6	-17	
200	-21	-20	-19	-20	-18	-20	-17	-15	-14	-12	-10	-6	0	7	7	5	5	-19	
250	-22	-22	-21	-21	-18	-18	-17	-15	-14	-12	-10	-7	-1	5	9	4	6	-18	
315	-23	-21	-21	-21	-20	-19	-18	-17	-16	-14	-11	-8	-1	5	7	9	5	-21	
400	-26	-20	-19	-20	-20	-19	-18	-15	-14	-12	-10	-5	-1	4	8	8	4	-26	
500	-22	-21	-18	-13	-16	-14	-14	-12	-10	-8	-6	-2	0	4	9	5	2	-25	
630	-22	-21	-17	-16	-15	-16	-16	-13	-12	-10	-7	-4	1	3	8	8	5	-24	
800	-18	-17	-13	-12	-8	-10	-11	-8	-6	-4	-3	0	2	5	6	6	3	-25	
1000	-21	-19	-13	-12	-8	-9	-11	-8	-7	-6	-4	-3	1	3	7	7	4	-25	
1250	-22	-19	-12	-12	-7	-8	-8	-4	-4	-3	-1	0	2	3	7	5	2	-25	
1600	-24	-21	-13	-12	-7	-7	-9	-2	-1	0	1	1	1	1	7	3	-1	-25	
2000	-26	-22	-15	-13	-8	-7	-9	-2	-1	1	3	2	-1	1	6	3	-2	-24	
2500	-26	-22	-15	-13	-9	-8	-9	-2	-1	2	2	2	1	1	5	5	-1	-25	
3150	-30	-25	-17	-14	-9	-10	-11	-3	-1	0	2	-1	0	2	4	7	1	-26	
4000	-31	-26	-17	-15	-10	-10	-11	-3	-2	0	1	-1	1	3	4	6	1	-26	
5000	-30	-25	-17	-15	-10	-10	-10	-3	-2	0	1	-1	2	2	5	5	-2	-27	
6300	-31	-24	-16	-15	-10	-10	-10	-2	-2	0	1	0	2	2	5	6	-3	-26	
8000	-31	-22	-16	-16	-10	-10	-11	-3	-3	-1	0	1	1	3	6	6	-4	-27	
10000	-28	-22	-16	-16	-11	-11	-11	-5	-4	-2	0	0	2	3	7	7	-4	-28	
OCTAVE																			
31.5	-17	-17	-16	-17	-16	-15	-14	-13	-10	-10	-7	-6	-3	2	7	9	9	1	
63	-22	-22	-21	-20	-19	-19	-17	-16	-14	-12	-11	-9	-2	2	7	10	4	-12	
125	-23	-22	-21	-21	-20	-20	-18	-17	-15	-13	-11	-9	-2	5	5	10	5	-17	
250	-23	-22	-20	-21	-19	-19	-18	-17	-15	-13	-11	-7	-1	6	8	7	5	-20	
500	-24	-20	-18	-18	-16	-17	-16	-13	-12	-10	-8	-4	0	4	8	7	4	-25	
1000	-19	-18	-13	-12	-8	-9	-10	-7	-6	-4	-1	2	1	2	7	6	3	-25	
2000	-25	-22	-14	-12	-8	-7	-9	-2	-1	1	2	1	1	1	6	4	-1	-25	
4000	-30	-25	-17	-15	-9	-10	-11	-3	-2	0	2	-1	1	2	4	6	0	-26	
8000	-30	-23	-16	-16	-10	-10	-10	-3	-3	-1	1	0	2	3	6	6	-4	-27	
OVERALL	-23	-21	-18	-18	-15	-15	-15	-11	-10	-8	-7	-5	0	5	7	8	5	-17	

TABLE: DIRECTIVITY INDEX (DB)										IDENTIFICATION:									
6										OMEGA 1.4									
NOISE SOURCE/SUBJECT:										TEST 75-002-660									
(RUN 03									
(F-104D AIRCRAFT									
(J79-GE-7/A ENGINE									
(24 JAN 79									
(FAR FIELD NOISE									
(PAGE 4									
FREQ										ANGLE (DEGREES)									
(HZ)																			
1/3 OCTAVE																			
(25																			
(31.5																			
(40																			
(50																			
(63																			
(80																			
(100																			
(125																			
(160																			
(200																			
(250																			
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(500																			
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(1000																			
(2000																			
(4000																			
(8000																			
OVERALL																			

FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL)
EQUAL LEVEL CONTOURS (DB)

5

IDENTIFICATION:

OMEGA 1.4

TEST 75-002-033

RUN 03

METEOROLOGY:

TEMP = 15 C

BAR PRESS = .760 H HG

REL HUMID = 70 %

OPERATIONS:

MILITARY POWER

100% RPM

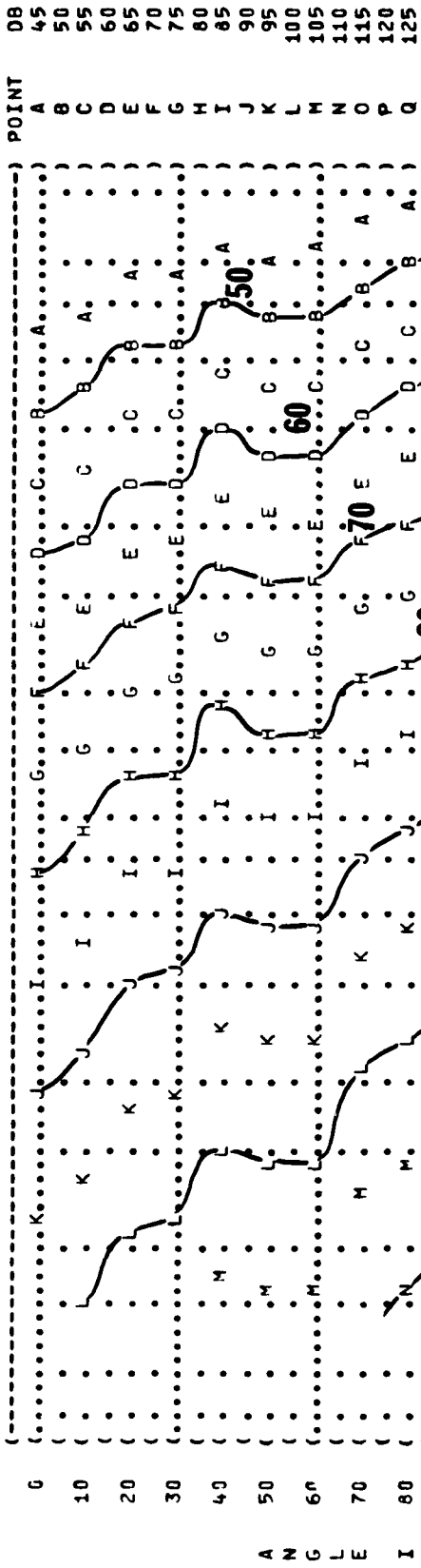
FREE FLOW

NOISE SOURCE/SUBJECT:

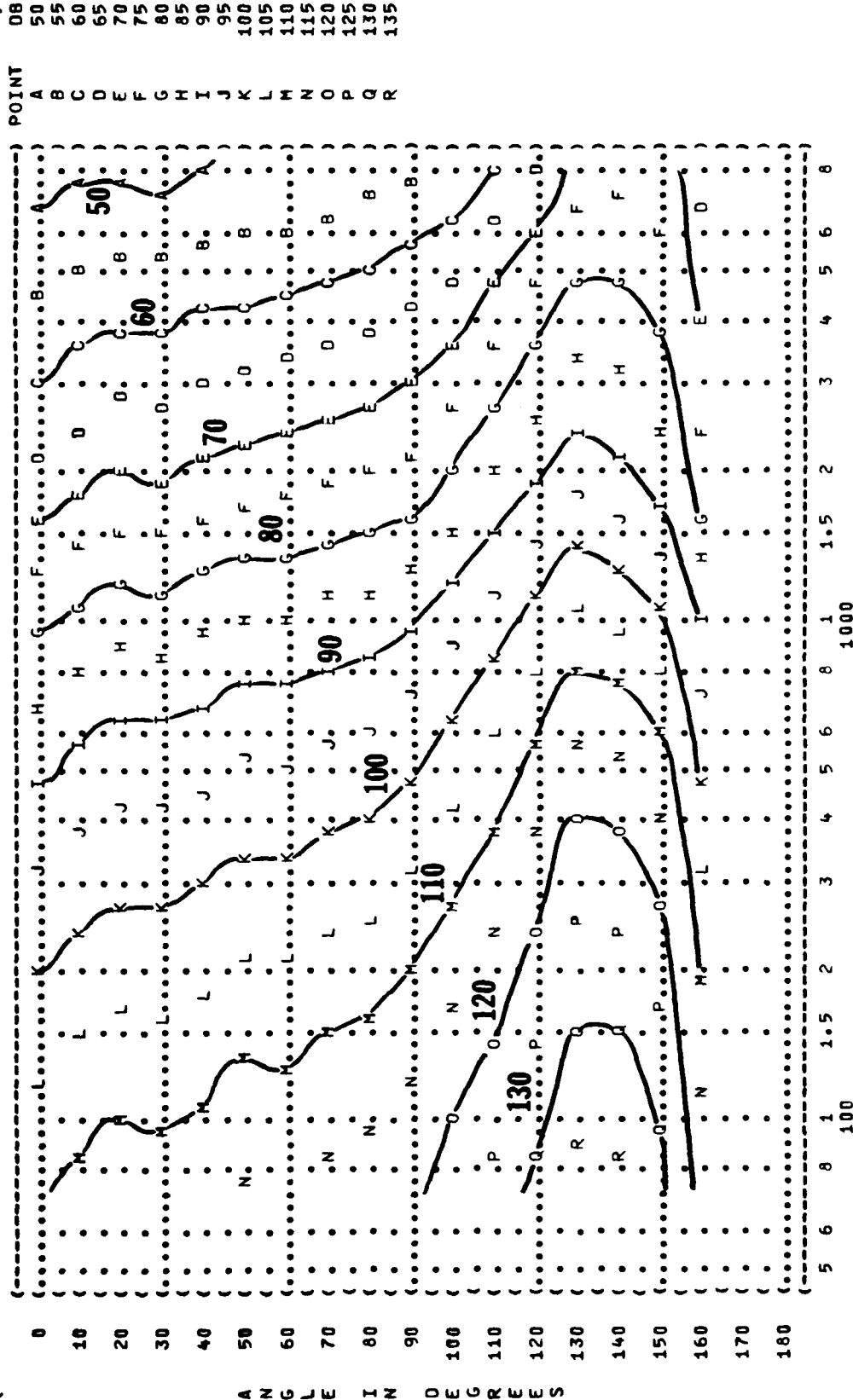
F-104D AIRCRAFT

J79-GE-7/A ENGINE

FAR FIELD NOISE

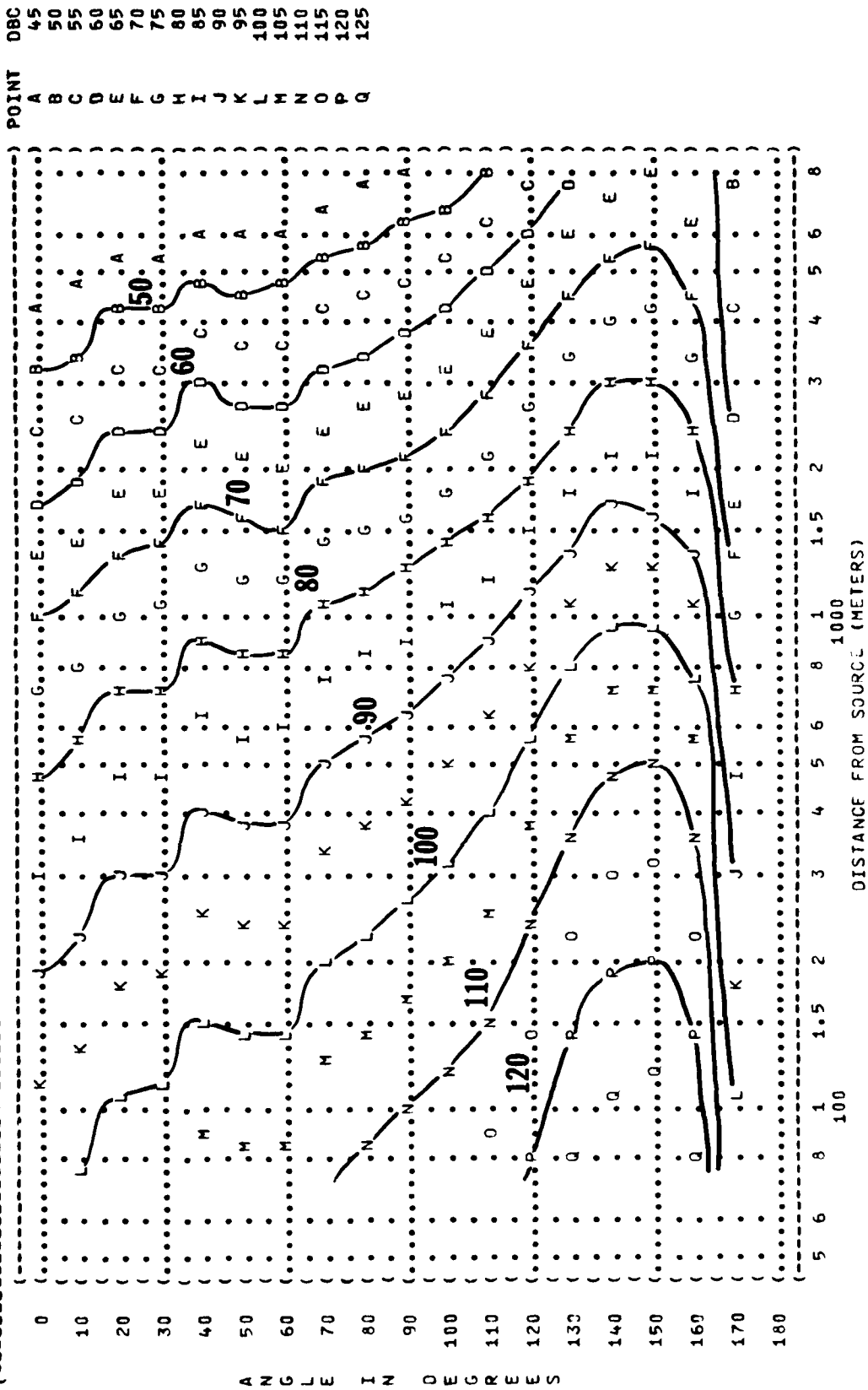


(FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL)
 (5
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (AFTERBURNER POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (DEFLECTED FLOW
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-060
 (RUN 03
 (24 JAN 79
 (PAGE 13

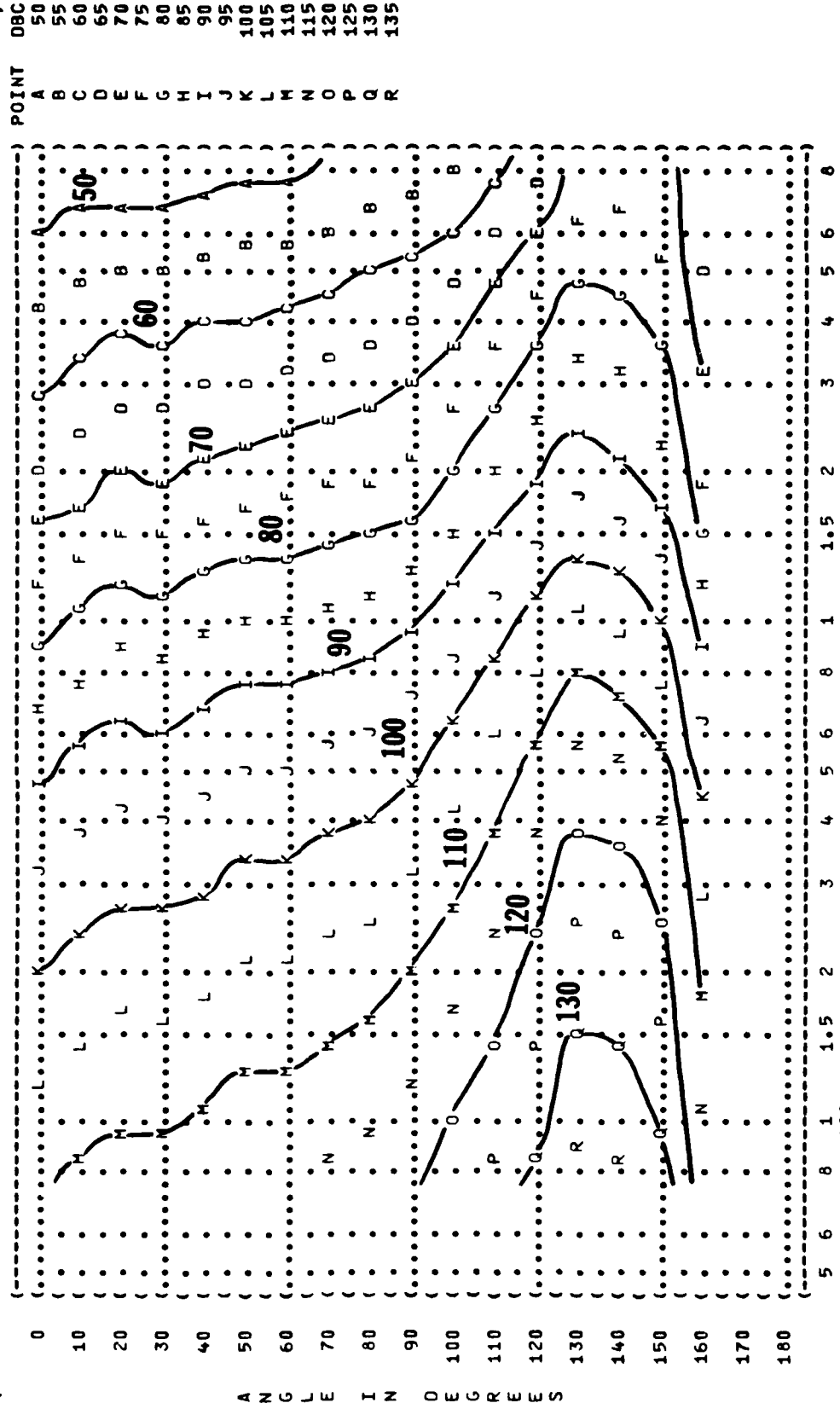


DISTANCE FROM SOURCE (METERS)

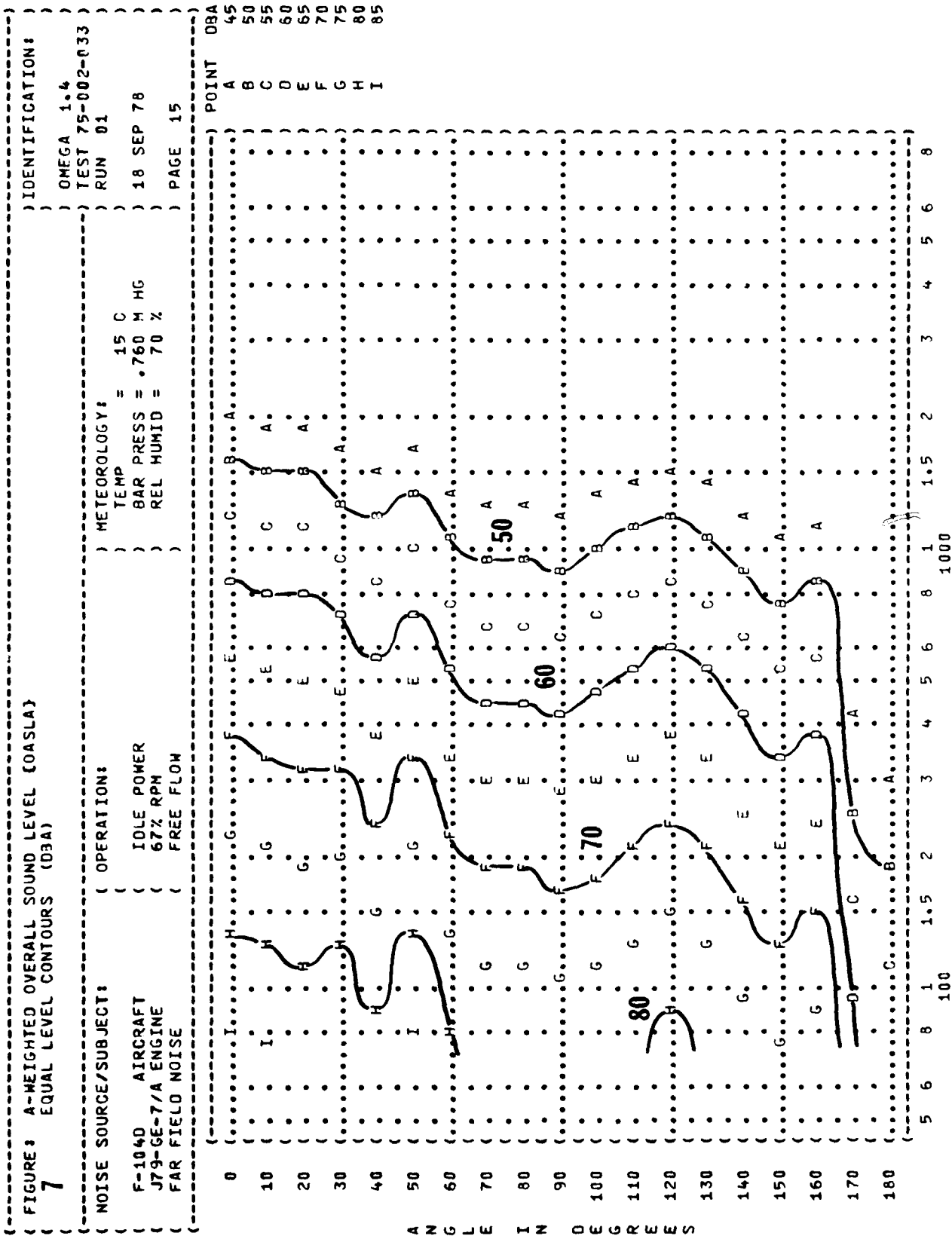
(FIGURE: C-WEIGHTED OVERALL SOUND LEVEL (OASLC)
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 (EQUAL LEVEL CONTOURS (DBC)
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 () OMEGA 1.4
 () TEST 75-002-033
 () RUN 03
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () 18 SEP 78
 () PAGE 14
 ()
 (NOISE SOURCE/SUBJECT: (OPERATION:
 ()
 (F-104D AIRCRAFT (MILITARY POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (FREE FLOW



() FIGURE: C-WEIGHTED OVERALL SOUND LEVEL (OASLC)
 () IDENTIFICATION:
 () 6
 () EQUAL LEVEL CONTOURS (DBC)
 () OMEGA 1.4
 () TEST 75-002-060
 () NOISE SOURCE/SUBJECT: () OPERATION:
 () METEOROLOGY:
 () F-104D AIRCRAFT () AFTERBURNER POWER () TEMP = 15 C
 () J79-GE-7/A ENGINE () 100% RPM () BAR PRESS = .760 M HG
 () FAR FIELD NOISE () DEFLECTED FLOW () REL HUMID = 70 %
 () 24 JAN 79
 () PAGE 14
 () RUN 03



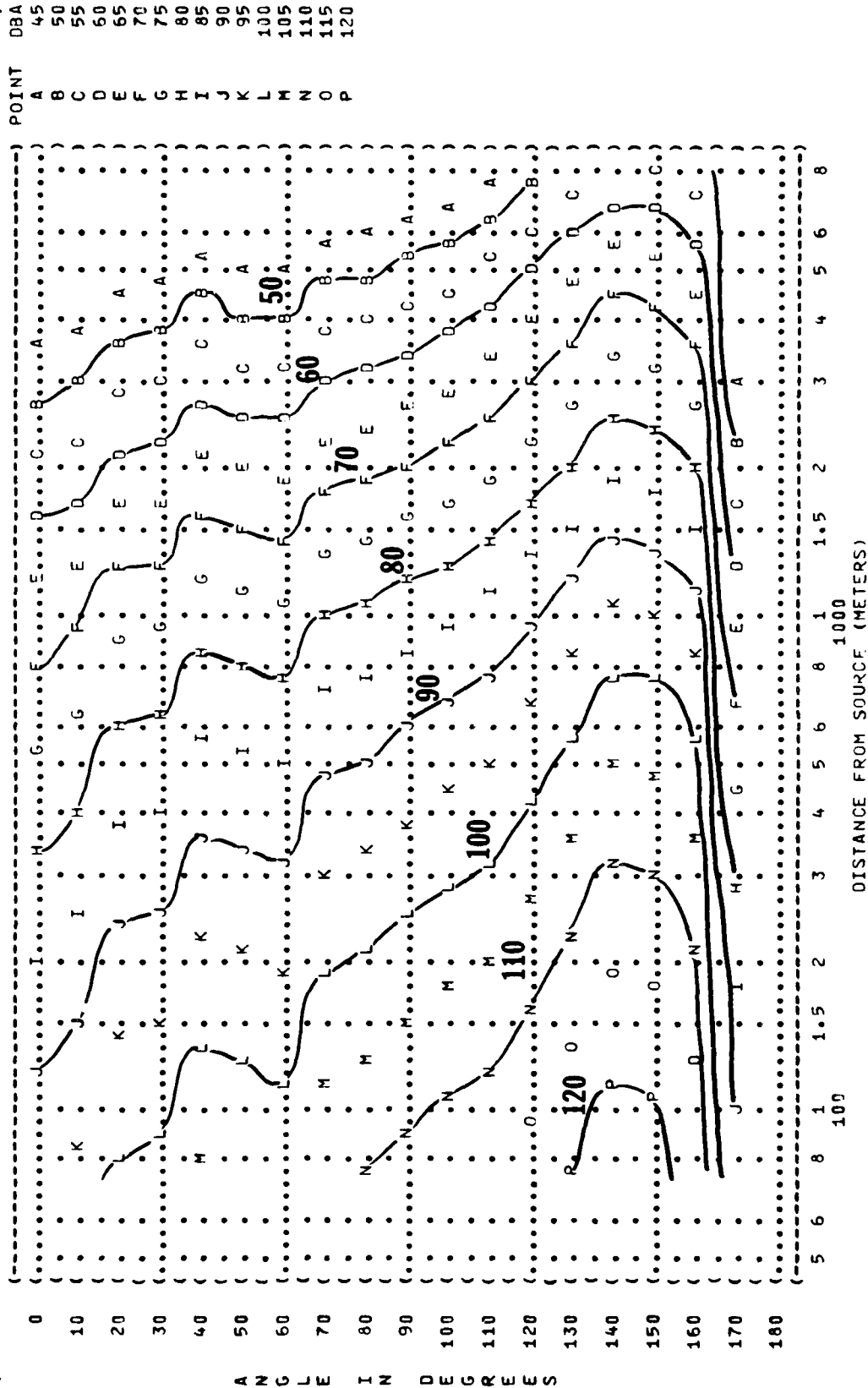
A N G L E I N D E G R E E S



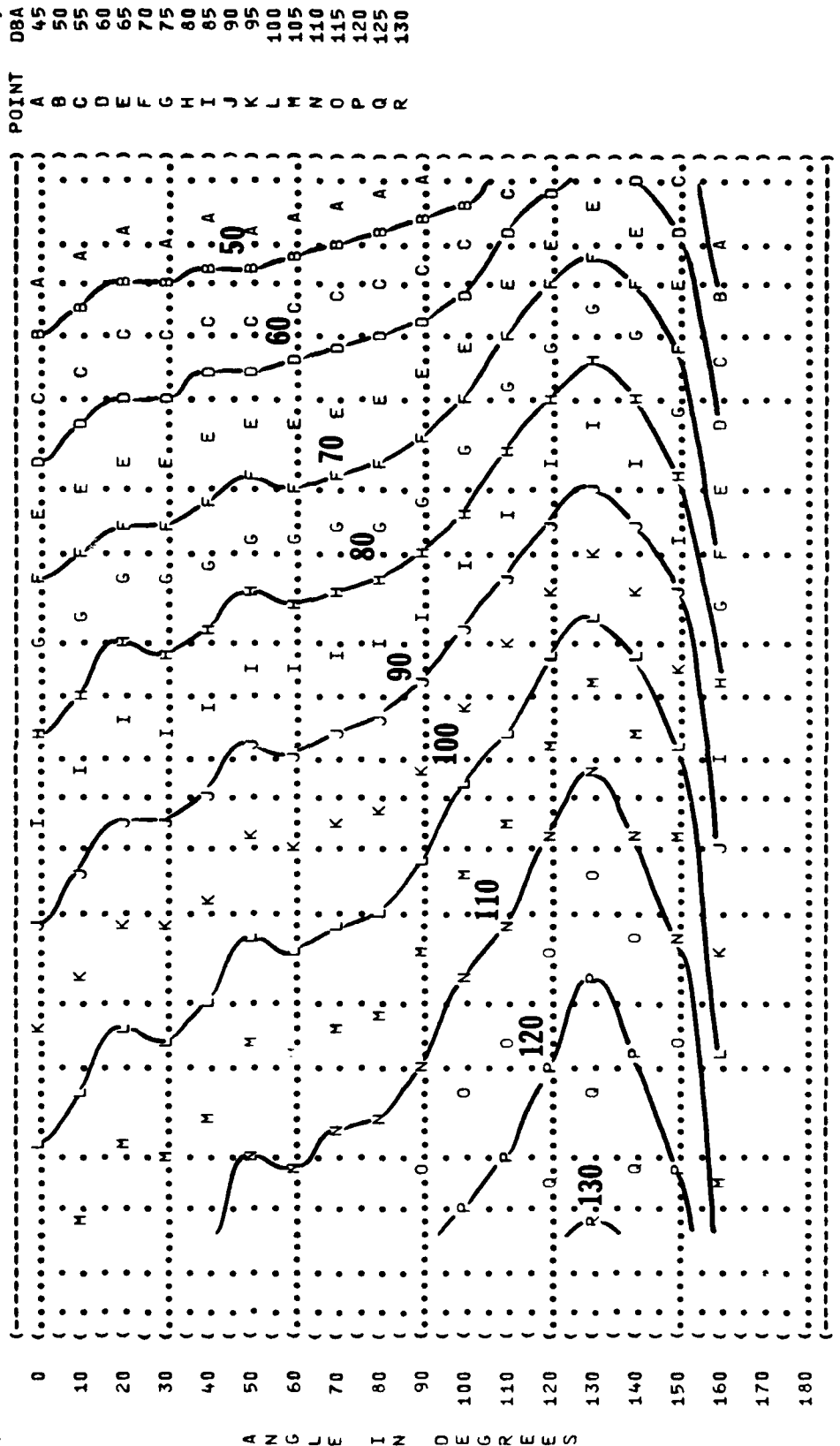
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( ) FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA)
( ) EQUAL LEVEL CONTOURS (DBA)
( ) 7
( ) NOISE SOURCE/SUBJECT: ( OPERATION: ) METEOROLOGY:
( ) F-104D AIRCRAFT ( MILITARY POWER = 15 C )
( ) J79-GE-7/A ENGINE ( 100% RPM BAR PRESS = .760 M HG )
( ) FAR FIELD NOISE ( FREE FLOW REL HUMID = 70 % )
( ) IDENTIFICATION: ) OMEGA 1.4
( ) TEST 75-002-033
( ) RUN 03
( ) 18 SEP 78
( ) PAGE 15

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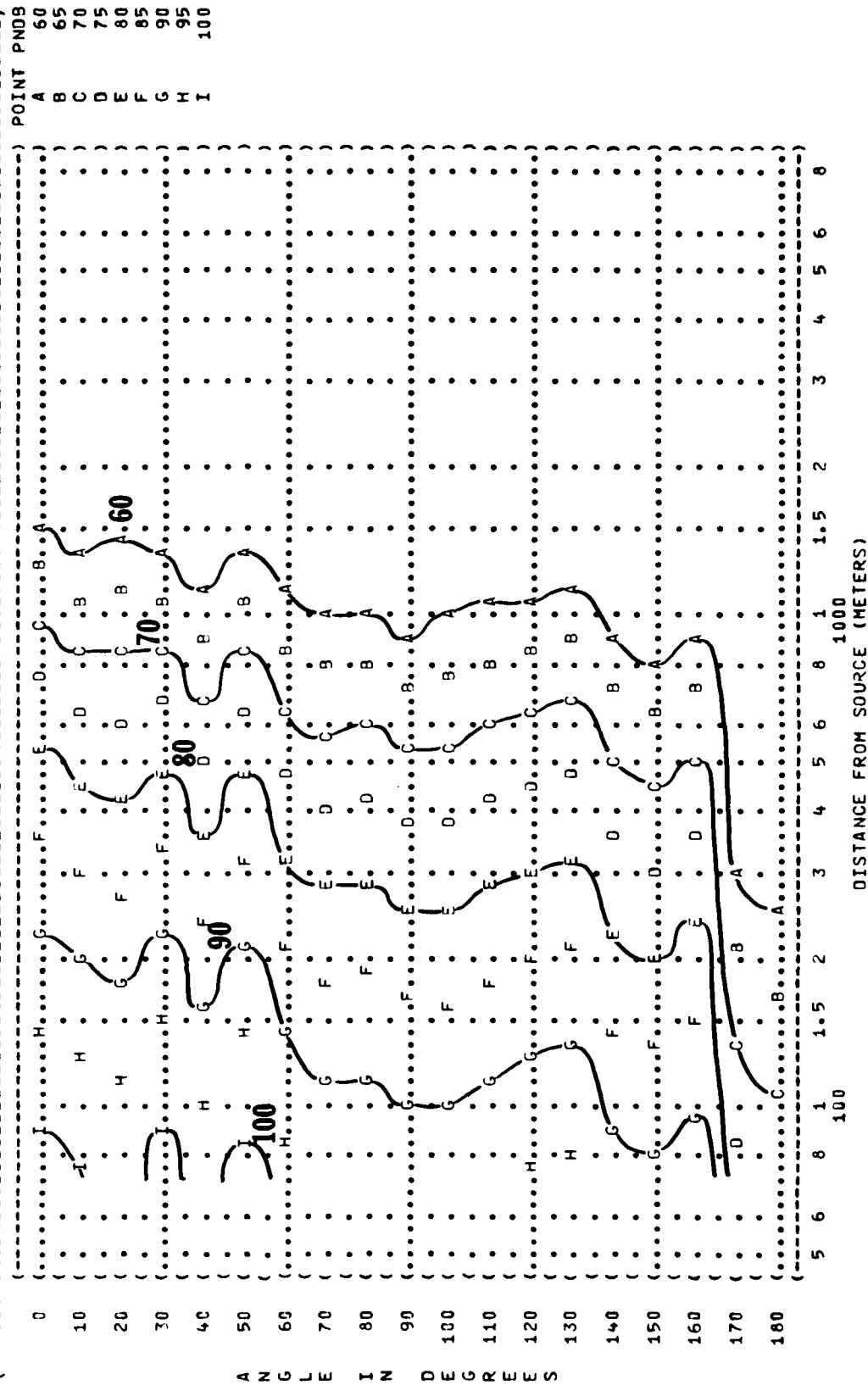


(FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA)
 (7
 (EQUAL LEVEL CONTOURS (DBA)
 () IDENTIFICATION:
 ()
 () OMEGA 1.4
 () TEST 75-002-060
 () RUN 03
 ()
 (NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:
 () TEMP = 15 C
 (F-1040 AIRCRAFT (AFTERBURNER POWER (BAR PRESS = .760 M HG
 (J79-GE-7/A ENGINE (100% RPM (REL HUMID = 70 %
 (FAR FIELD NOISE (DEFLECTED FLOW)
 () PAGE 15
 ()

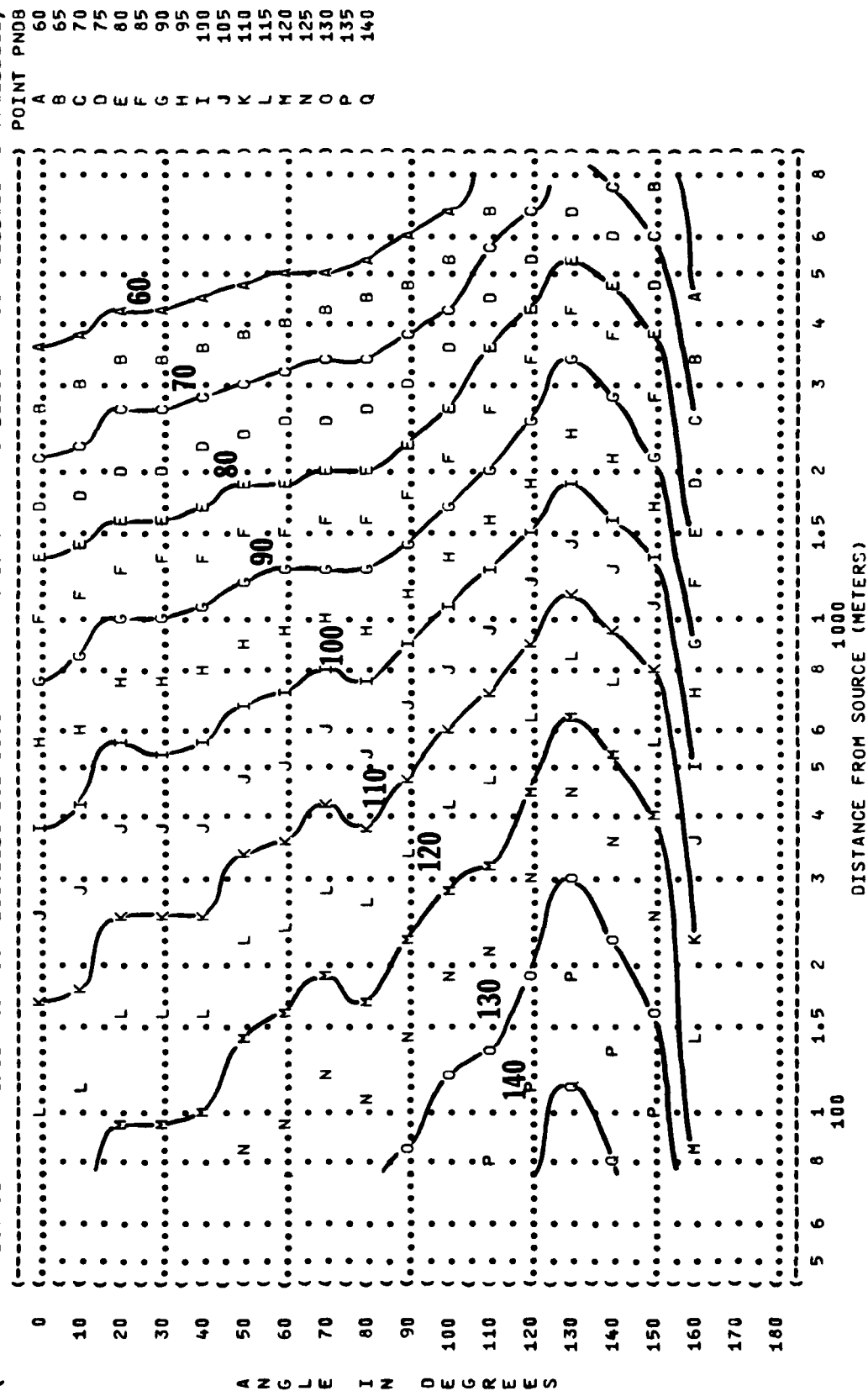


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(-----)
( FIGURE: PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION {PNLT} ) IDENTIFICATION: )
(      8    EQUAL LEVEL CONTOURS (PNOB) ) )
( ) ) OMEGA 1.4 )
(-----)
( NOISE SOURCE/SUBJECT: ) OPERATION: ) METEOROLOGY: )
( ) ) ) ) ) )
( F-104D AIRCRAFT ) IDLE POWER ) TEMP = 15 C ) )
( J79-GE-7/A ENGINE ) 67% RPM ) BAR PRESS = .760 M HG ) )
( FAR FIELD NOISE ) FREE FLOW ) REL HUMID = 70 % ) )
( ) ) ) ) PAGE 16 )
(-----)
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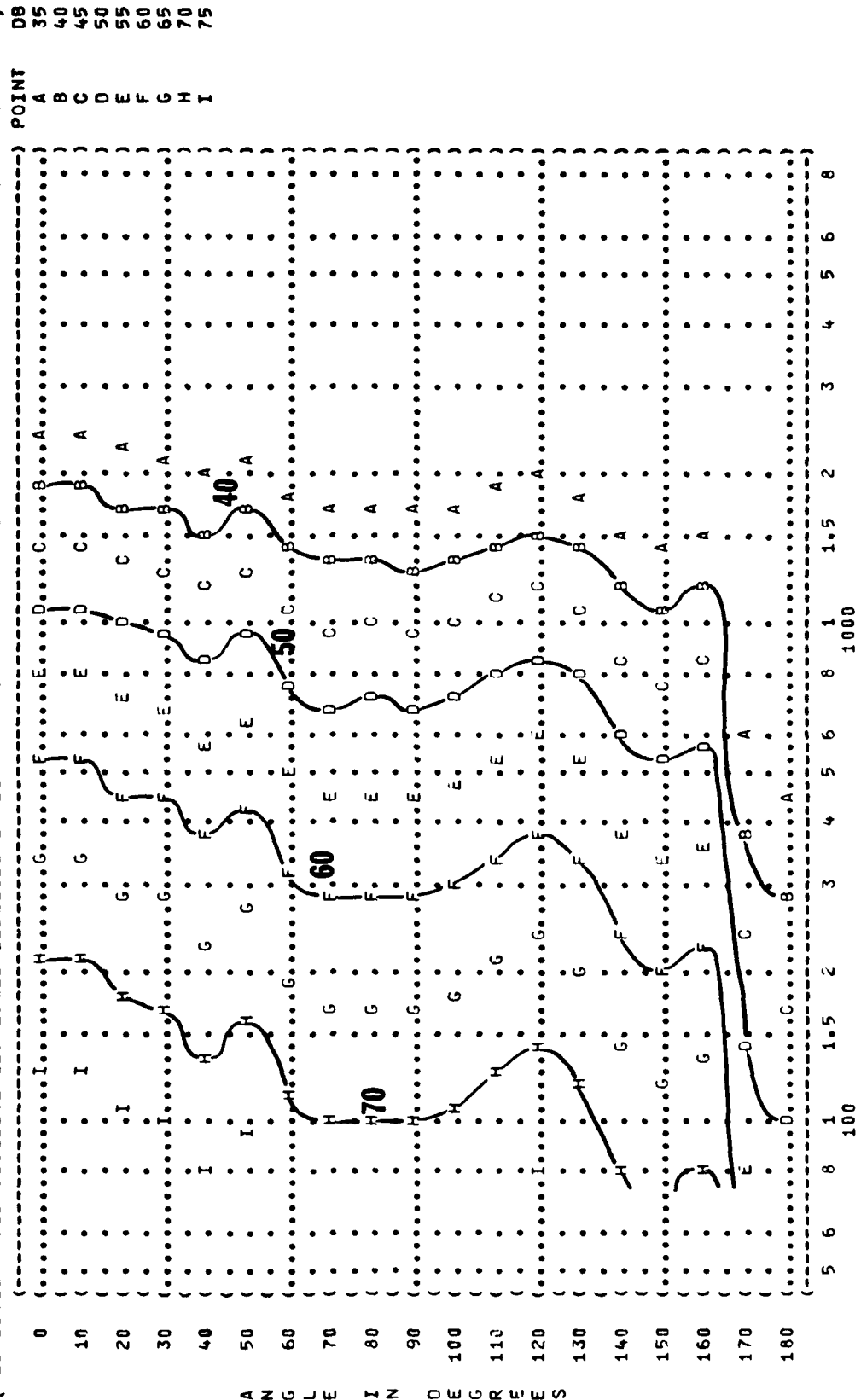

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(-----)
( FIGURE: PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION {PNLT} ) IDENTIFICATION:
(      8      EQUAL LEVEL CONTOURS (PNOB) )
( ) OMEGA 1.4 )
( TEST 75-002-060 )
( NOISE SOURCE/SUBJECT: ) METEOROLOGY:
( F-104D AIRCRAFT ) TEMP = 15 C
( J79-GE-7/A ENGINE ) AFTERBURNER POWER ) BAR PRESS = .760 M HG
( FAR FIELD NOISE ) 100% RPM ) REL HUMID = 70 %
( DEFLECTED FLOW ) ) PAGE 16
(-----)
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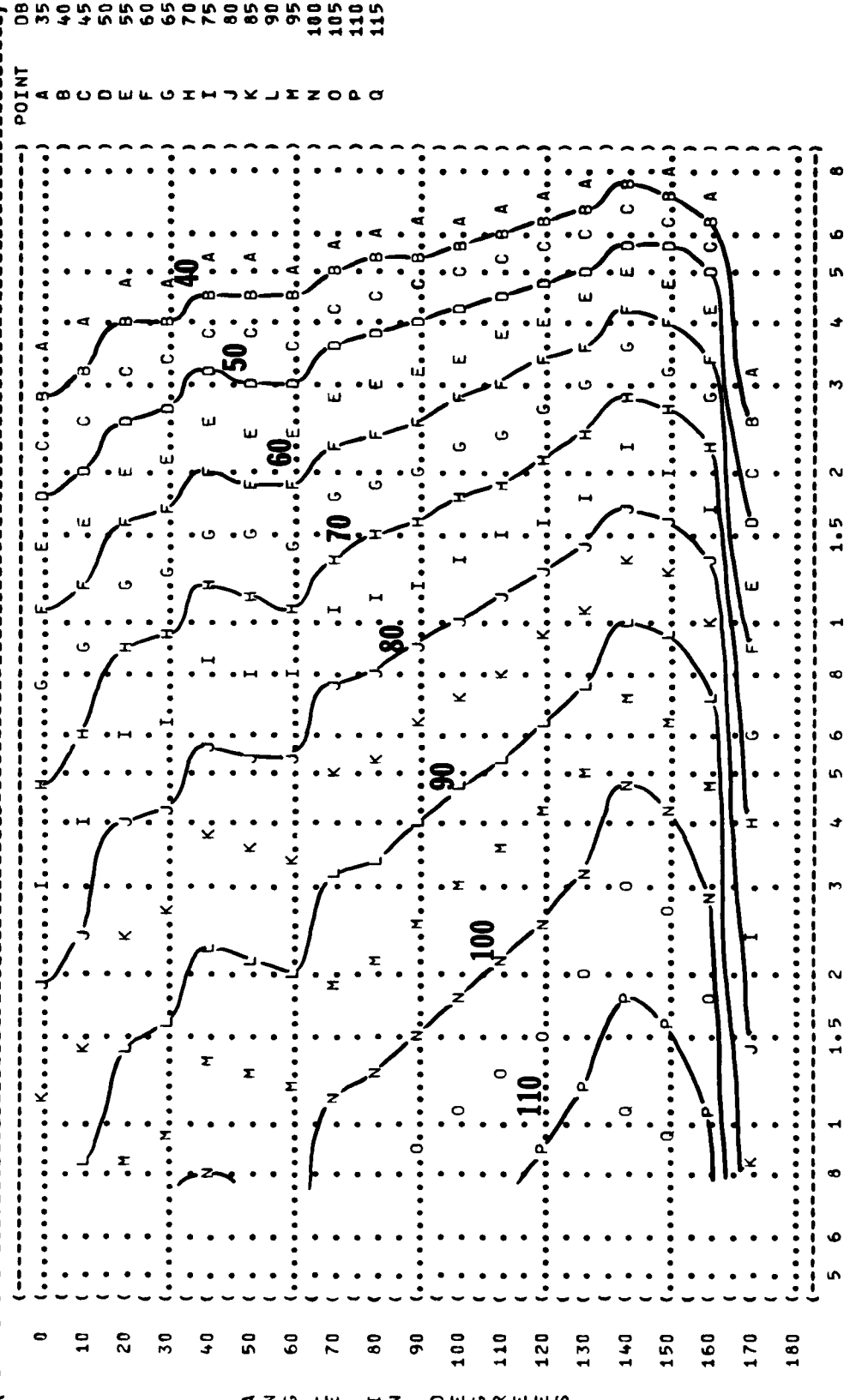
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( FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL {PSIL} ) IDENTIFICATION:
(   EQUAL LEVEL CONTOURS   (DB) )
(
( 9 )
(-----)
( NOISE SOURCE/SUBJECT:      ) OPERATION:
(
( F-104D      AIRCRAFT      ) IDLE POWER
( J79-GE-7/A  ENGINE       ) 67% RPM
( FAR FIELD NOISE          ) FREE FLOW
(-----)
( METEOROLOGY:
(   TEMP      = 15 C
(   BAR PRESS = .760 M HG
(   REL HUMID = 70 %
(-----)
( OMEGA 1.4 )
( TEST 75-002-033 )
( RUN 01 )
( PAGE 17 )
(-----)

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DISTANCE FROM SOURCE (METERS)

(FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL)
 (EQUAL LEVEL CONTOURS (DB)
 (9
 (IDENTIFICATION:
 ()
 () OMEGA 1.4
 () TEST 75-002-033
 () RUN 03
 (NOISE SOURCE/SUBJECT: (OPERATION:
 () METEOROLOGY:
 () TEMP = 15 C
 () F-1040 AIRCRAFT (MILITARY POWER
 () J79-GE-7/A ENGINE (100% RPM
 () BAR PRESS = .760 M HG
 () FAR FIELD NOISE (FREE FLOW
 () REL HUMID = 70 %
 () PAGE 17



DISTANCE FROM SOURCE (METERS)

10



1

0< ()
10< ()
20< ()
30< ()
40< ()
50< ()
60< ()
70< ()
80< ()
90< ()
100< ()
110< ()
120< ()
130< ()
140< ()
150< ()
160< ()
170< ()
180< ()

PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY
AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 75 METERS
FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)
UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:

MINIMUM QPL EAR MUFFS
AMERICAN OPTICAL 1700 EAR MUFFS
V-51R EAR PLUGS
COMFIT TRIPLE FLANGE EAR PLUGS
H-133 GROUND COMMUNICATION UNIT

PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY

AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 75 METERS

FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)

UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:

MINIMUM QPL EAR MUFFS

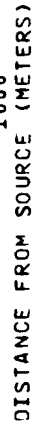
AMERICAN OPTICAL 1700 EAR MUFFS

V-51R EAR PLUGS

COMFIT TRIPLE FLANGE EAR PLUGS

H-133 GROUND COMMUNICATION UNIT

[illegible]

[illegible]

() FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)) IDENTIFICATION:)
 () 10) EQUAL TIME CONTOURS (MINUTES))
 () AMERICAN OPTICAL 1700 EAR MUFFS) OMEGA 1.4
 ()) TEST 75-002-033)
 () NOISE SOURCE/SUBJECT: () OPERATION:) METEOROLOGY:)
 ())) TEMP = 15 C)
 () F-104D AIRCRAFT () MILITARY POWER) BAR PRESS = .760 M HG)
 () J79-GE-7/A ENGINE () 100% RPM) REL HUMID = 70 %)
 () FAR FIELD NOISE () FREE FLOW)) PAGE 9)

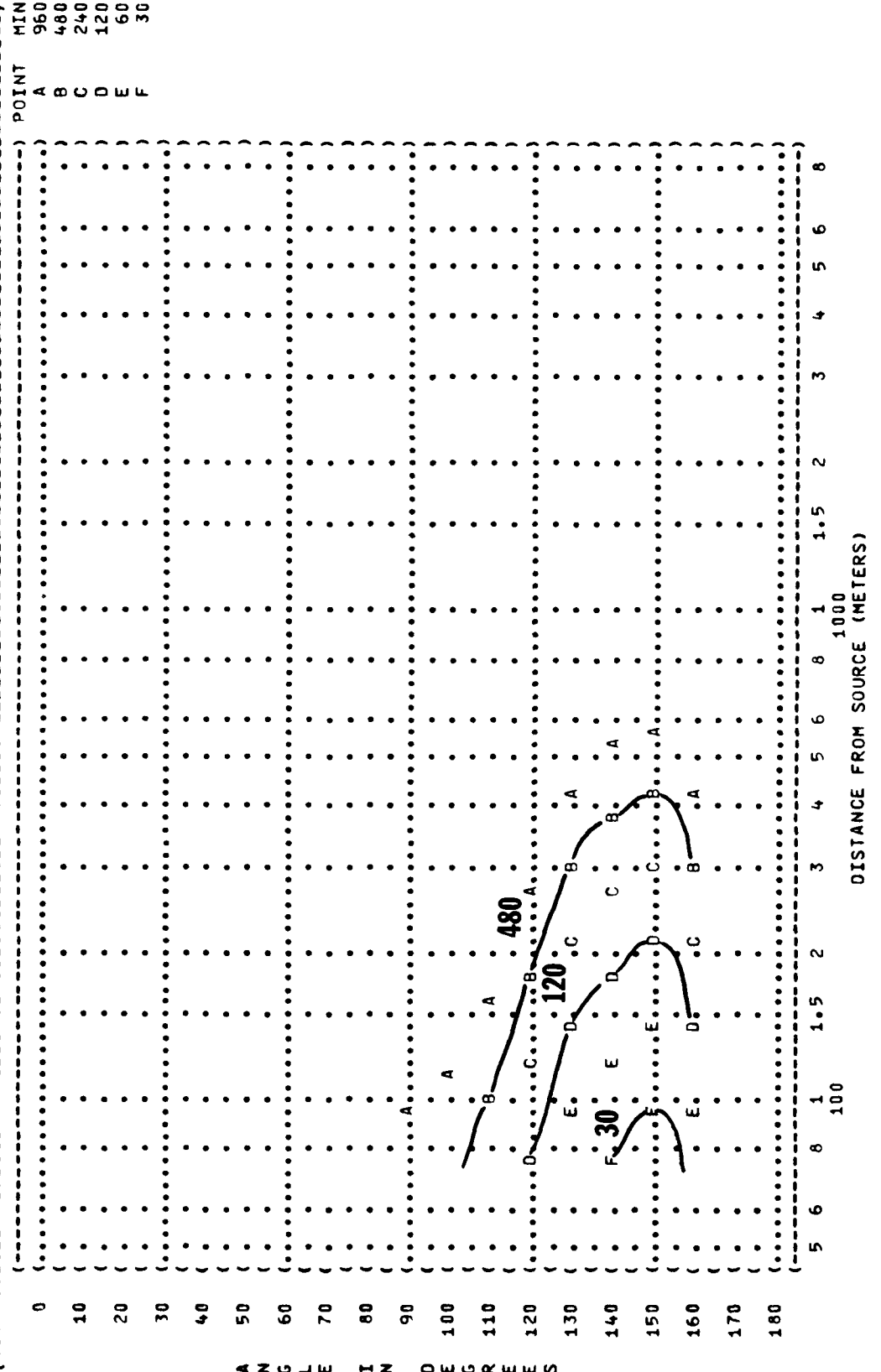


FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

IDENTIFICATION:

10

EQUAL TIME CONTOURS (MINUTES)

OMEGA 1.4

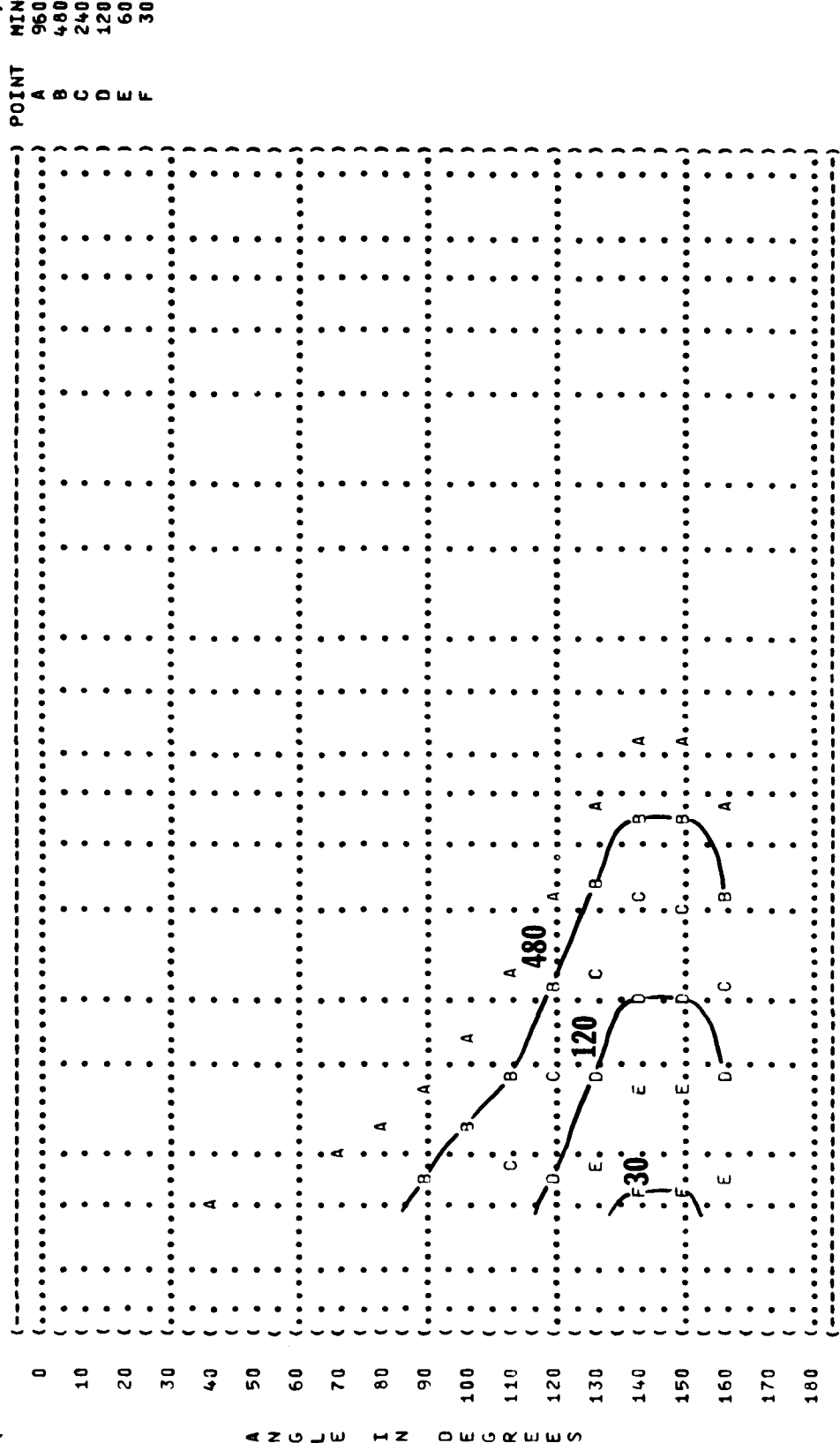
TEST 75-002-033

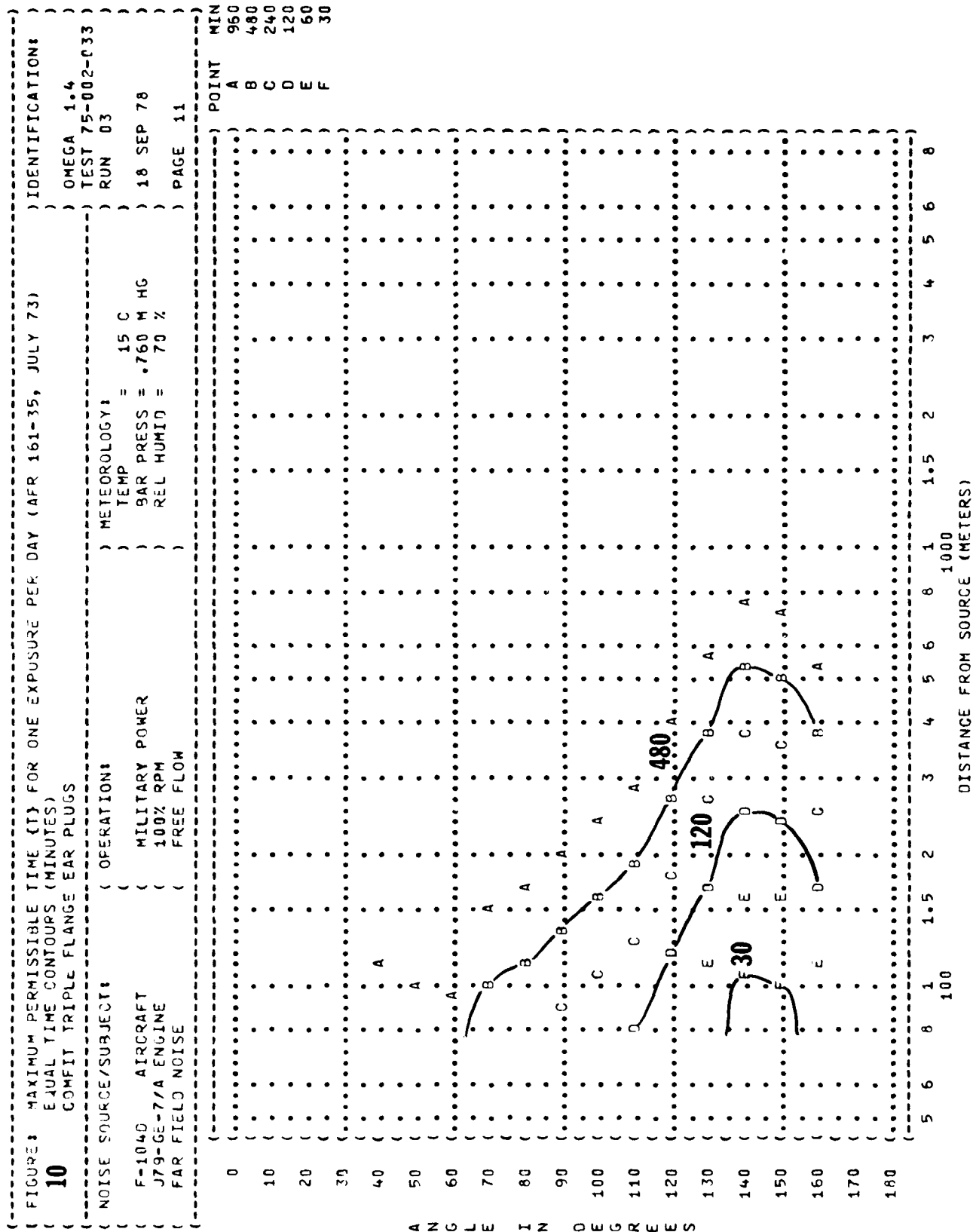
NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY: (TEMP = 15 C) RUN 03

F-104D AIRCRAFT (MILITARY POWER) BAR PRESS = .760 H HG

J79-GE-7/A ENGINE (100% RPM) REL HUMID = 70 %

FAR FIELD NOISE (FREE FLOW) PAGE 10





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(-----)
( FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( 10 EQUAL TIME CONTOURS (MINUTES) ) )
( H-133 GROUND COMMUNICATION UNIT ) OMEGA 1.4 )
(-----)
( NOISE SOURCE/SUBJECT: ) OPERATION: ) METEOROLOGY: ) TEST 75-002-033 )
( F-104D AIRCRAFT ) ) TEMP = 15 C ) RUN 03 )
( J79-GE-7/A ENGINE ) MILITARY POWER ) BAR PRESS = .760 M HG ) 18 SEP 78 )
( FAR FIELD NOISE ) 100% RPM ) REL HUMID = 70 % ) )
( FREE FLOW ) ) PAGE 12 )
(-----)
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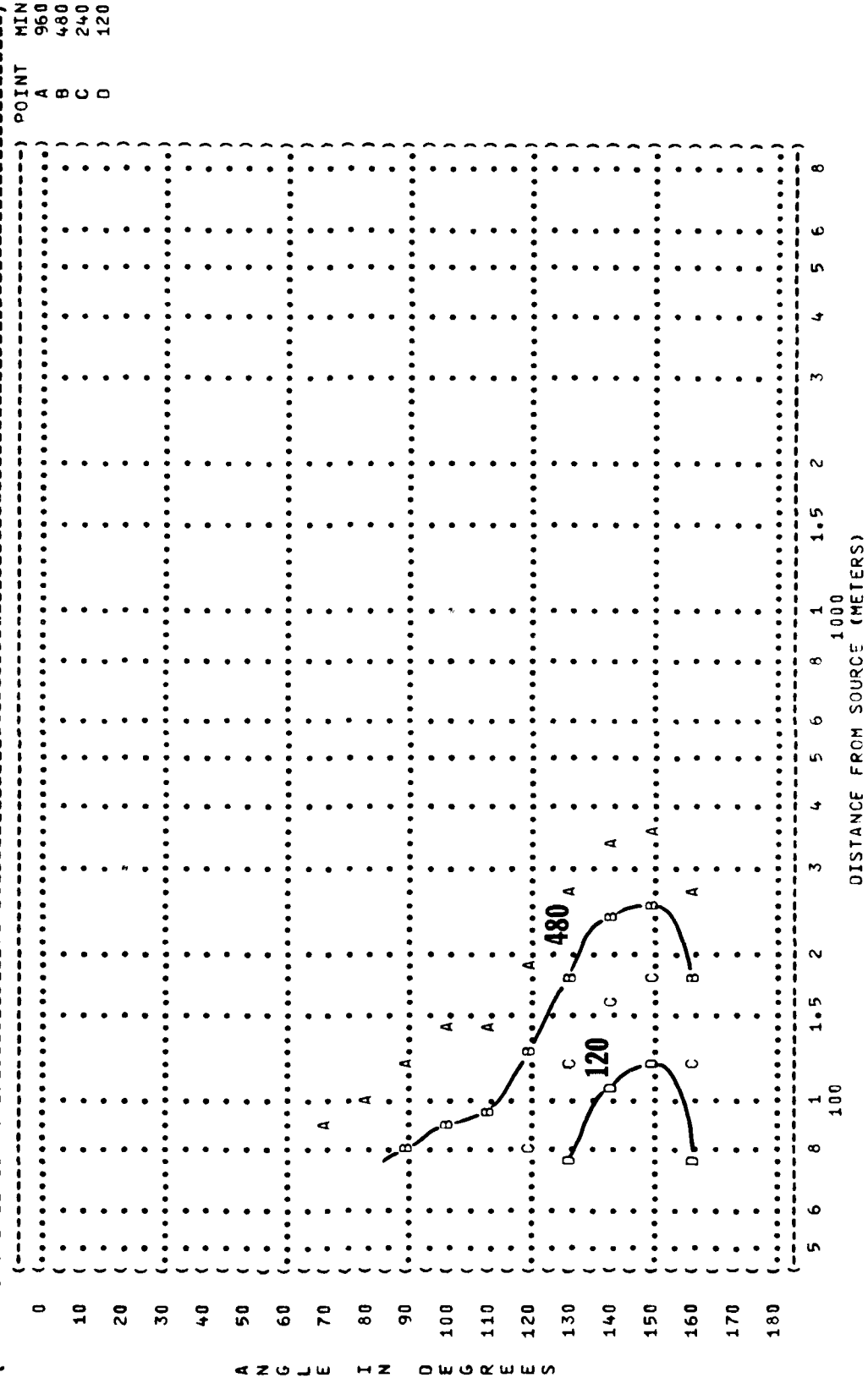


FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

IDENTIFICATION:

10 EQUAL TIME CONTOURS (MINUTES)

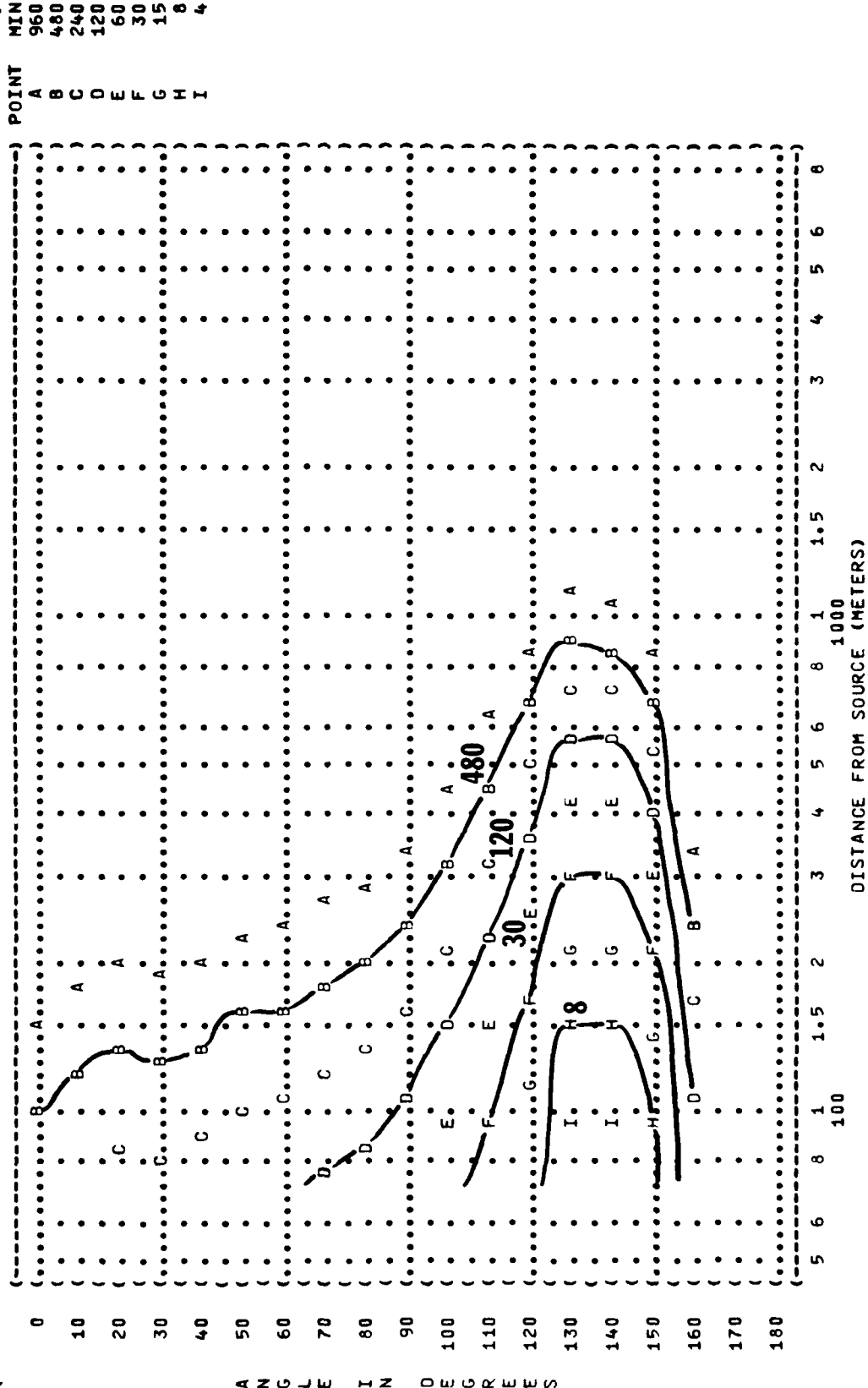
MINIMUM QPL EAR MUFFS

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY: TEMP = 15 C) 24 JAN 79) RUN 03) PAGE 8)

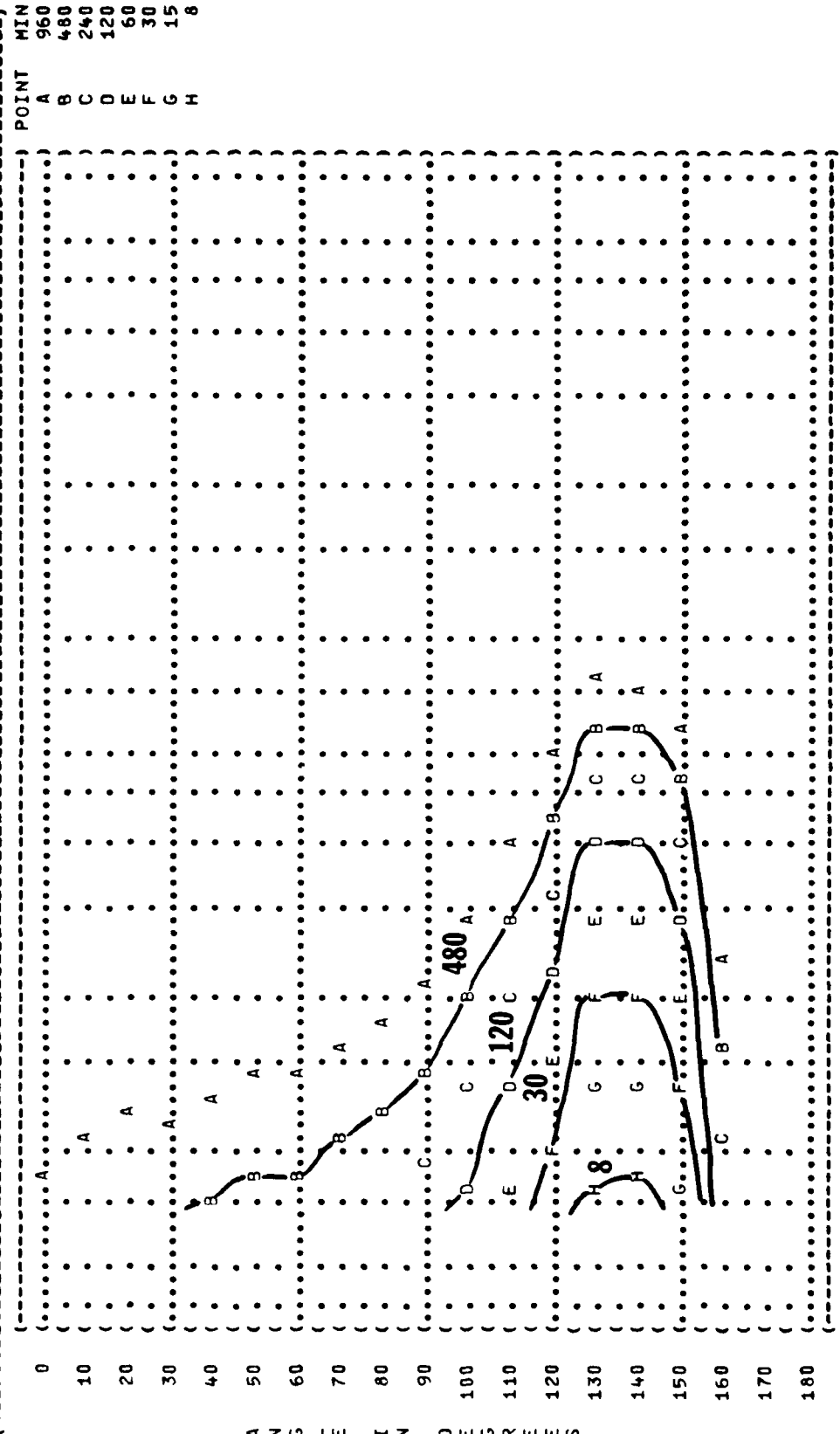
F-104D AIRCRAFT (AFTERBURNER POWER () BAR PRESS = .760 M HG)

J79-GE-7/A ENGINE (100% RPM () REL HUMID = 70 %)

FAR FIELD NOISE (DEFLECTED FLOW ()



(FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)) IDENTIFICATION:)
 () EQUAL TIME CONTOURS (MINUTES))
 (10 AMERICAN OPTICAL 1700 EAR MUFFS) OMEGA 1.4)
 () TEST 75-002-060)
 (NOISE SOURCE/SUBJECT:) OPERATION:) METEOROLOGY:) RUN 03)
 ()))
 (F-1040 AIRCRAFT)) TEMP = 15 C))
 (J79-GE-7/A ENGINE)) 100% RPM) BAR PRESS = .760 M HG) 24 JAN 79)
 (FAR FIELD NOISE)) DEFLECTED FLOW) REL HUMID = 70 %))
 ()))) PAGE 9)



DISTANCE FROM SOURCE (METERS)

```
( ) FIGURE: MAXIMUM PERMISSIBLE TIME {T} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION:
( ) EQUAL TIME CONTOURS (MINUTES) ) )
( ) 10 ) )
( ) V-51R EAR PLUGS ) OMEGA 1.4
( ) ----- ) TEST 75-002-060
( ) NOISE SOURCE/SUBJECT: ( OPERATION: ) METEOROLOGY: ) RUN 03
( ) F-104D AIRCRAFT ( ) TEMP = 15 C ) )
( ) AFTERBURNER POWER ( ) BAR PRESS = .760 M HG ) 24 JAN 79
( ) 100% RPM ( ) REL HUMID = 70 % ) )
( ) DEFLECTED FLOW ( ) ) ) PAGE 10
( ) FAR FIELD NOISE ) )
```

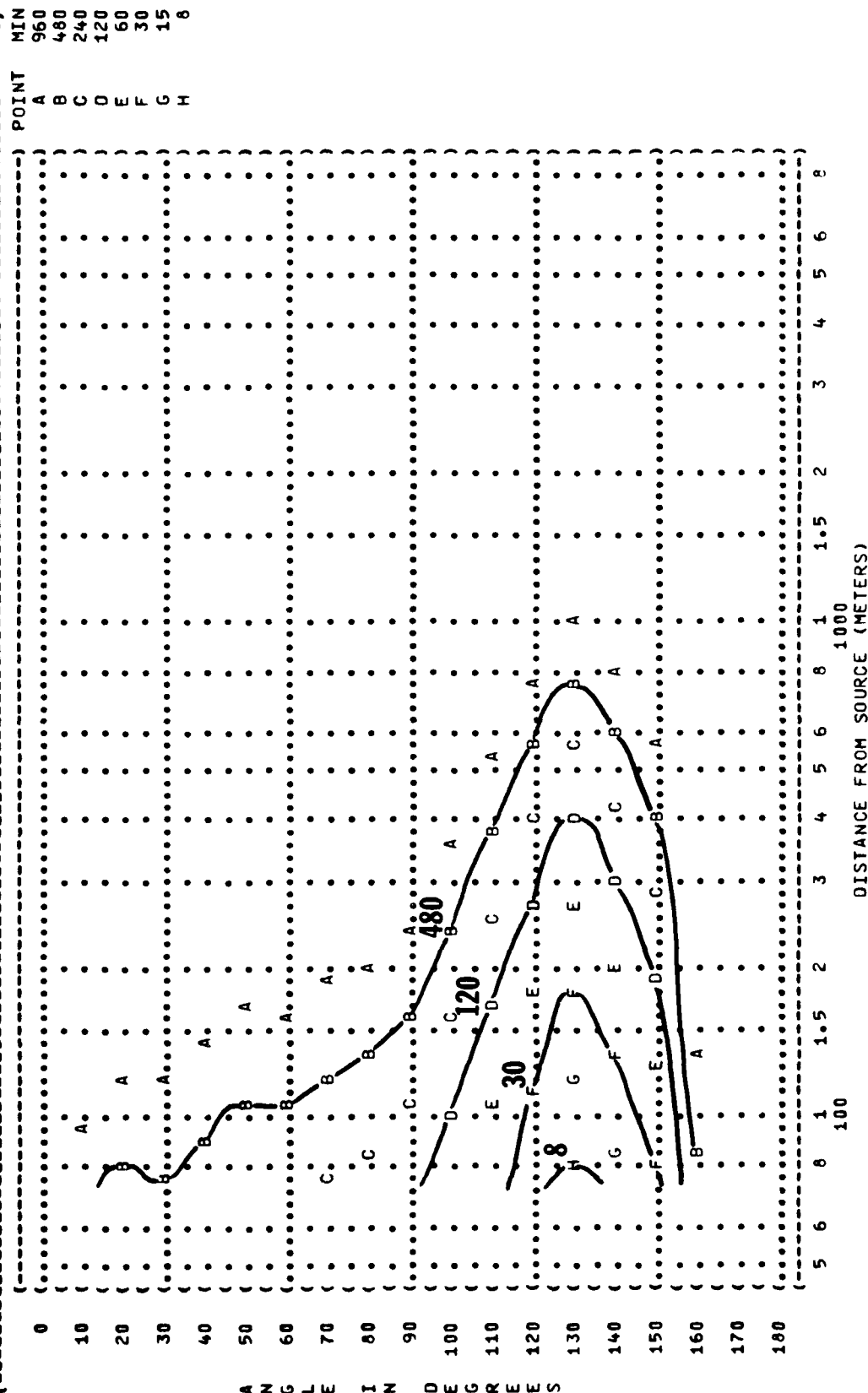
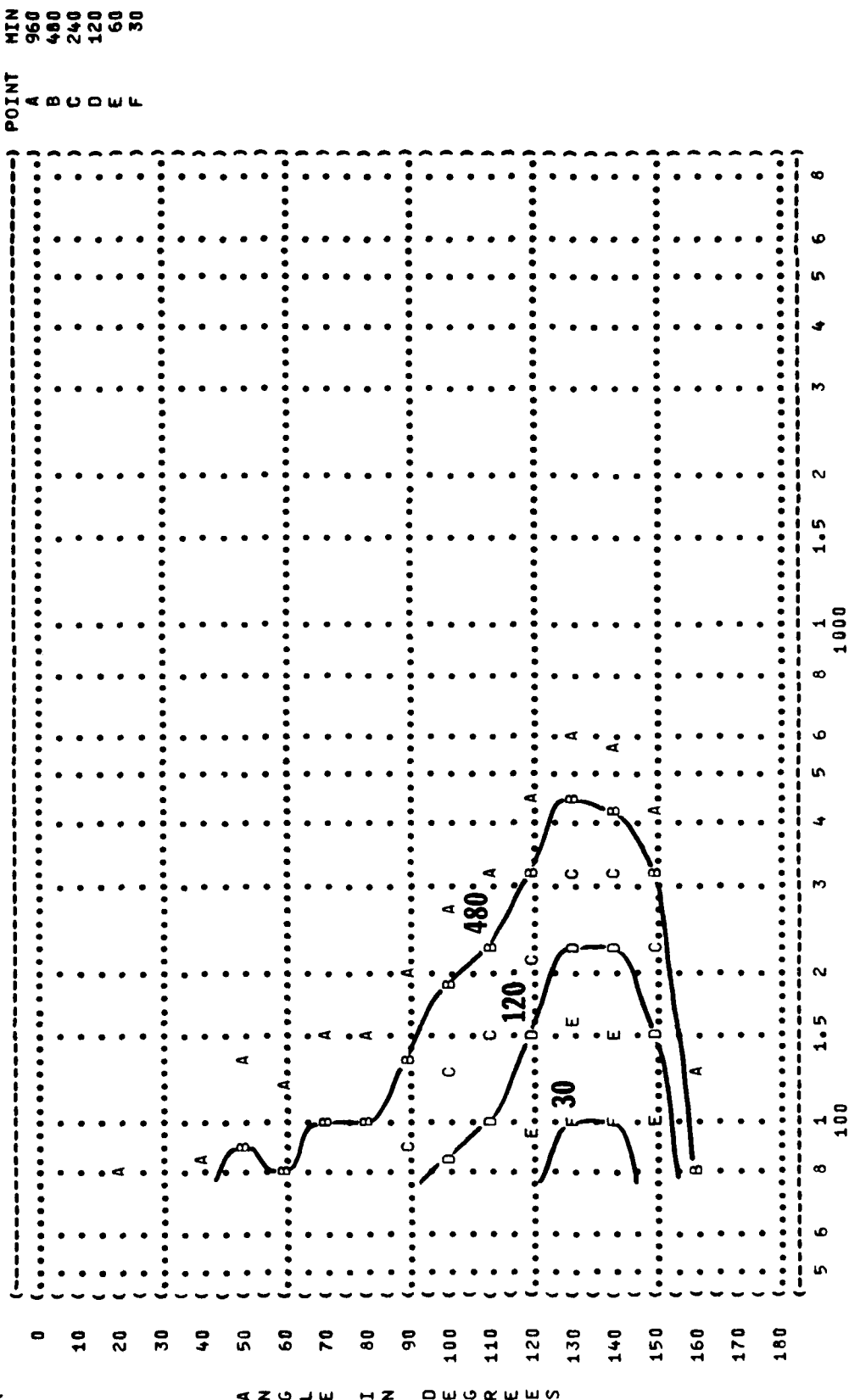
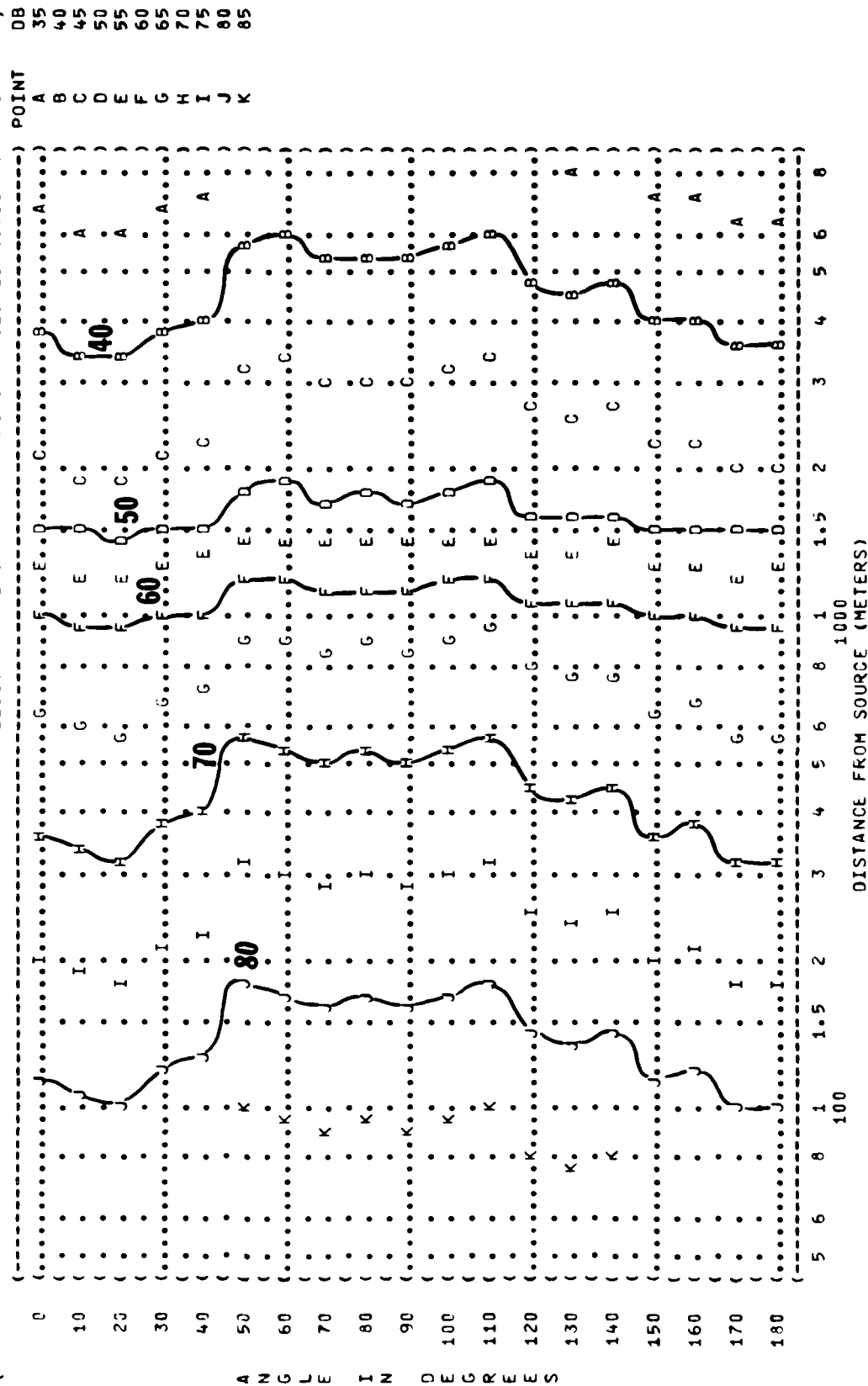


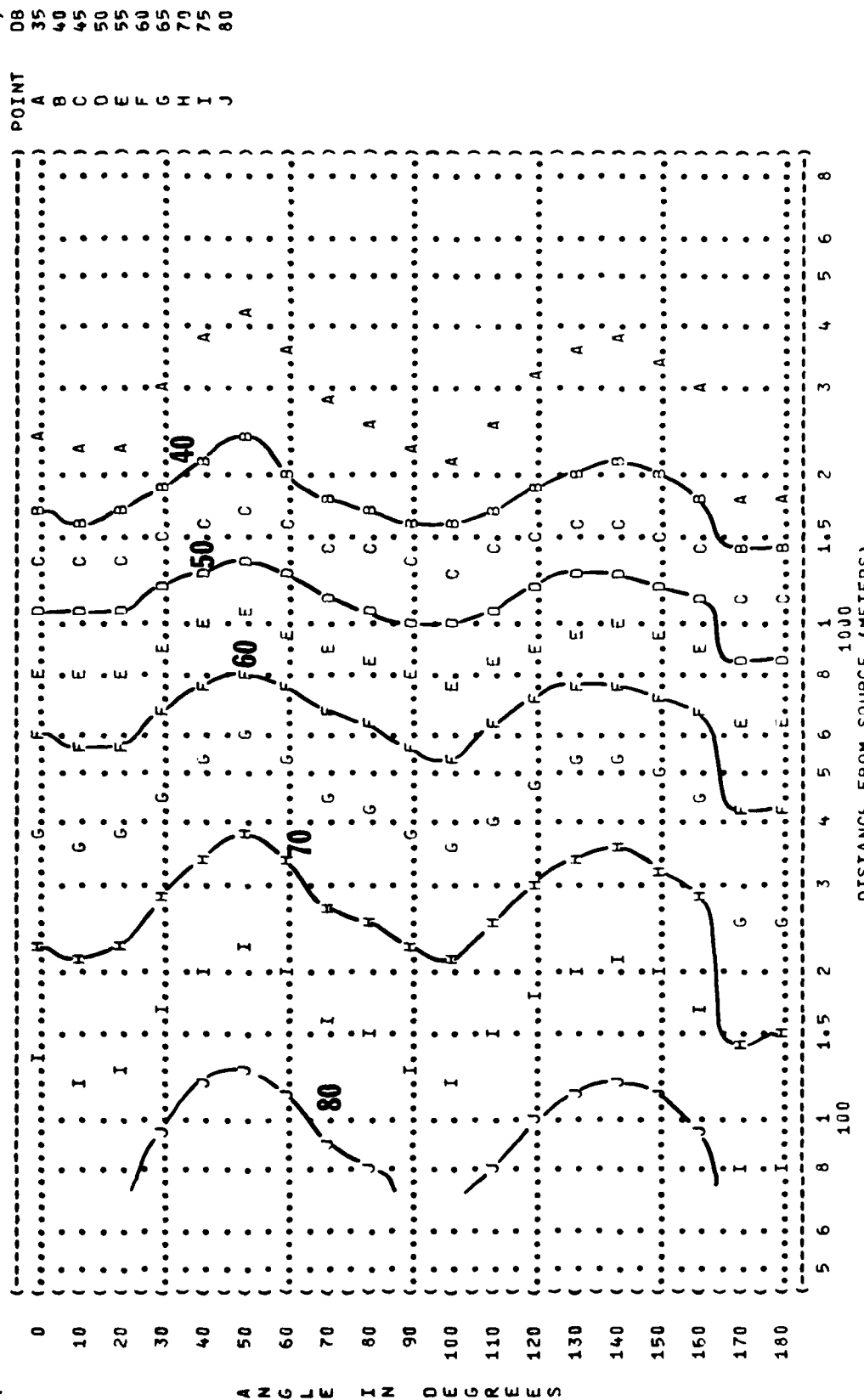
FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) IDENTIFICATION:)
 EQUAL TIME CONTOURS (MINUTES))
 H-133 GROUND COMMUNICATION UNIT) OMEGA 1.4
 NOISE SOURCE/SUBJECT: (OPERATION:) TEST 75-002-060
 ()) RUN 03
 F-1040 AIRCRAFT ())
 J79-GE-7/A ENGINE (AFTERBURNER POWER) TEMP = 15 C
 FAR FIELD NOISE (100% RPM) BAR PRESS = .760 M HG
 (DEFLECTED FLOW) REL HUMID = 70 %
 ())
 ()) PAGE 12



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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( 11 ) OMEGA 1.4 )
( 31.5 HZ OCTAVE BAND ) TEST 75-002-033 )
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) RUN 01 )
( ( OPERATION: ) TEMP = 15 C ) )
( F-104D AIRCRAFT ) IDLE POWER ) BAR PRESS = .760 M HG )
( J79-GE-7/A ENGINE ) 67% RPM ) )
( FAR FIELD NOISE ) FREE FLOW ) PAGE 18 )
(-----)
```

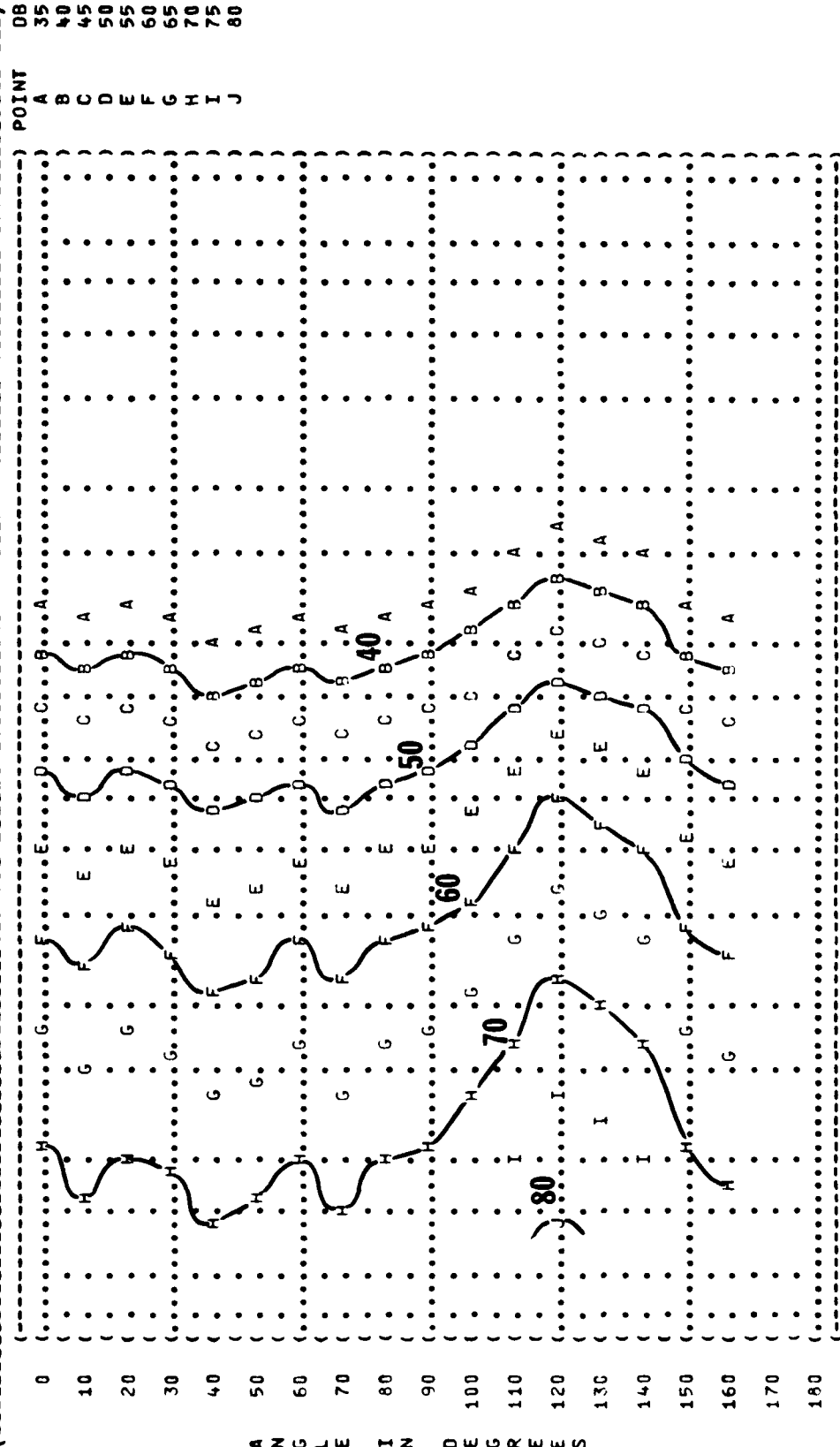


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (11 EQUAL LEVEL CONTOURS (DB)
 (63 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (IDLE POWER
 (J79-GE-7/A ENGINE (67% RPM
 (FAR FIELD NOISE (FREE FLOW
 (METEOROLOGY: (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION: (OMEGA 1.4
 (TEST 75-002-033
 (RUN 01
 (18 SEP 78
 (PAGE 19



A N G L E I N D E G R E E S

(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (11)
 (250 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (F-104D AIRCRAFT)
 (J79-GE-7/A ENGINE)
 (FAR FIELD NOISE)
 (OPERATION:)
 (IDLE POWER)
 (67% RPM)
 (FREE FLOW)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 75-002-033)
 (RUN 01)
 (18 SEP 78)
 (PAGE 21)

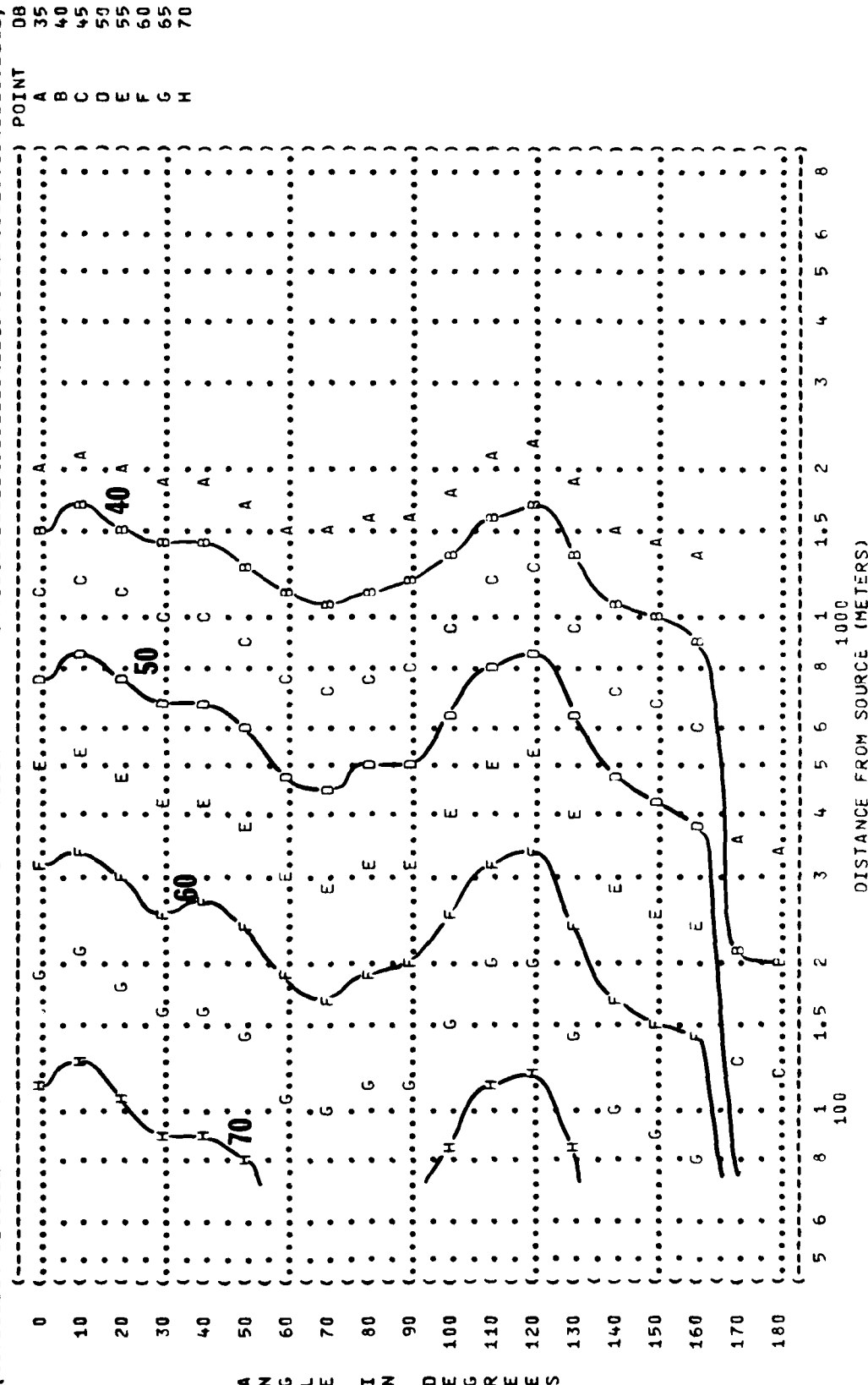


DISTANCE FROM SOURCE (METERS)
 5 6 8 1 1.5 2 3 4 5 6 8
 100 1000

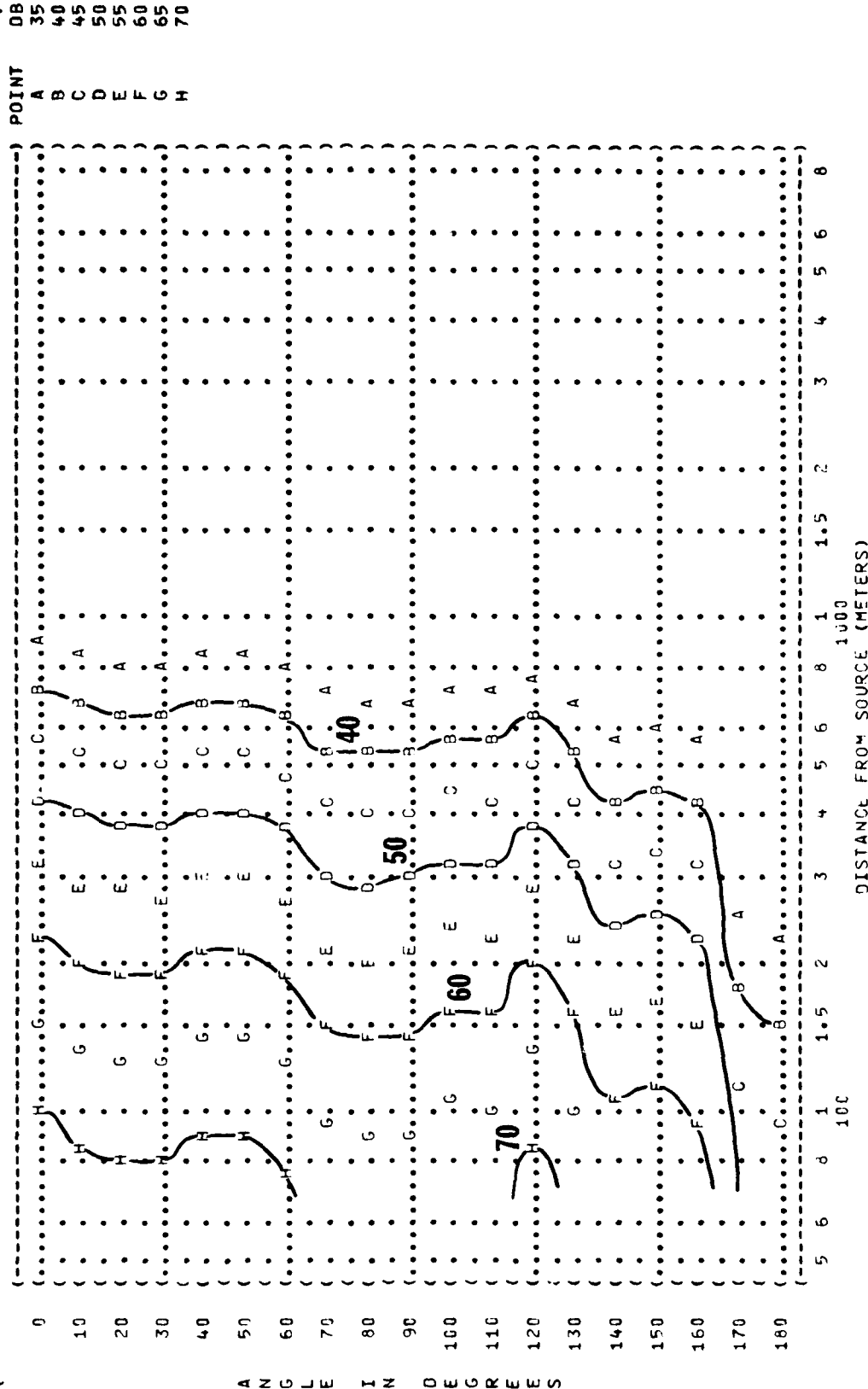

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( ( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 11 ) OMEGA 1.4 )
( ( 1000 HZ OCTAVE BAND ) TEST 75-002-033 )
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( ) TEMP = 15 C )
( ( F-104D AIRCRAFT ) IDLE POWER ) BAR PRESS = .760 M HG )
( ( J79-GE-7/A ENGINE ) 67% RPM ) REL HUMID = 70 % )
( ( FAR FIELD NOISE ) FREE FLOW ) PAGE 23 )

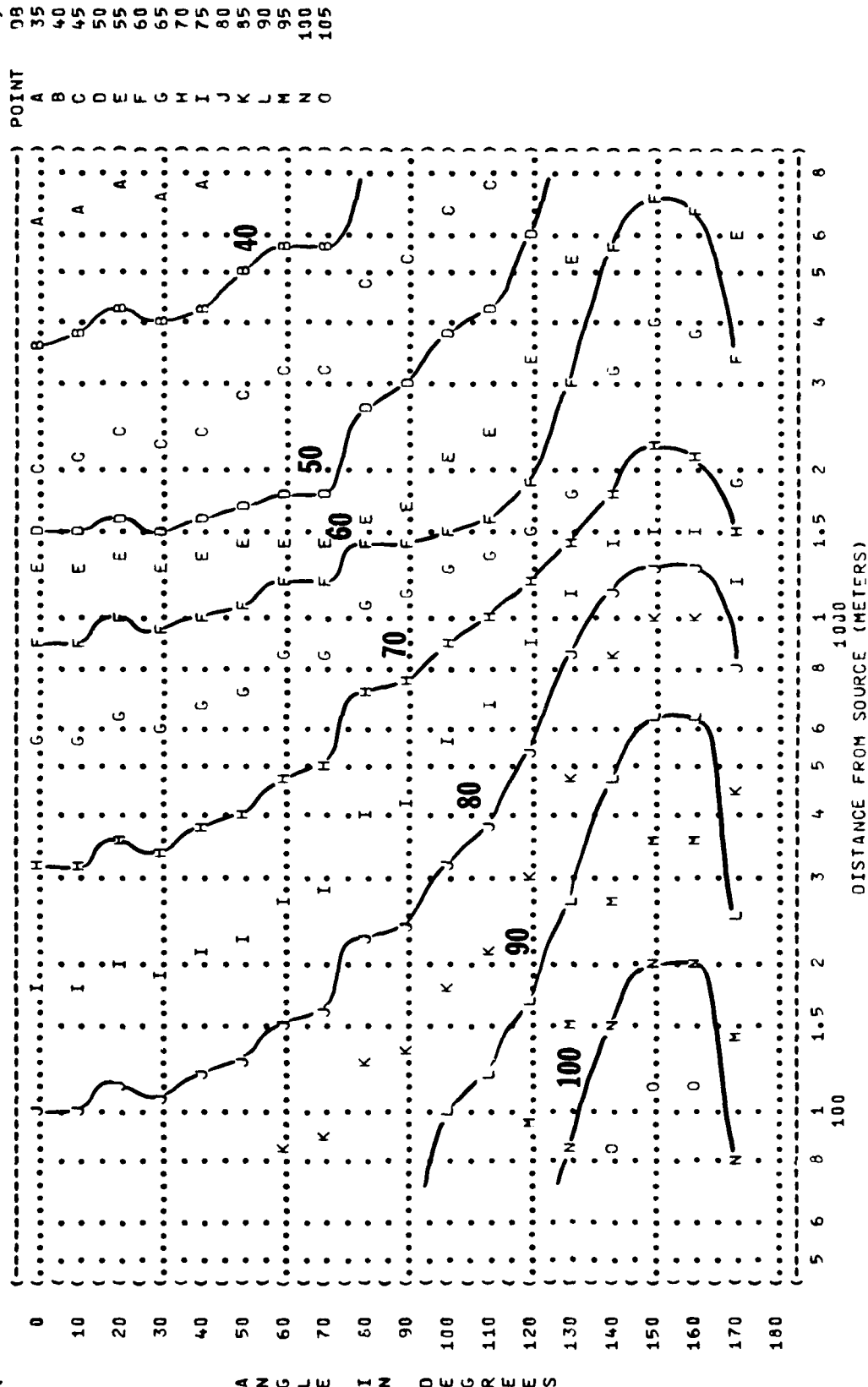
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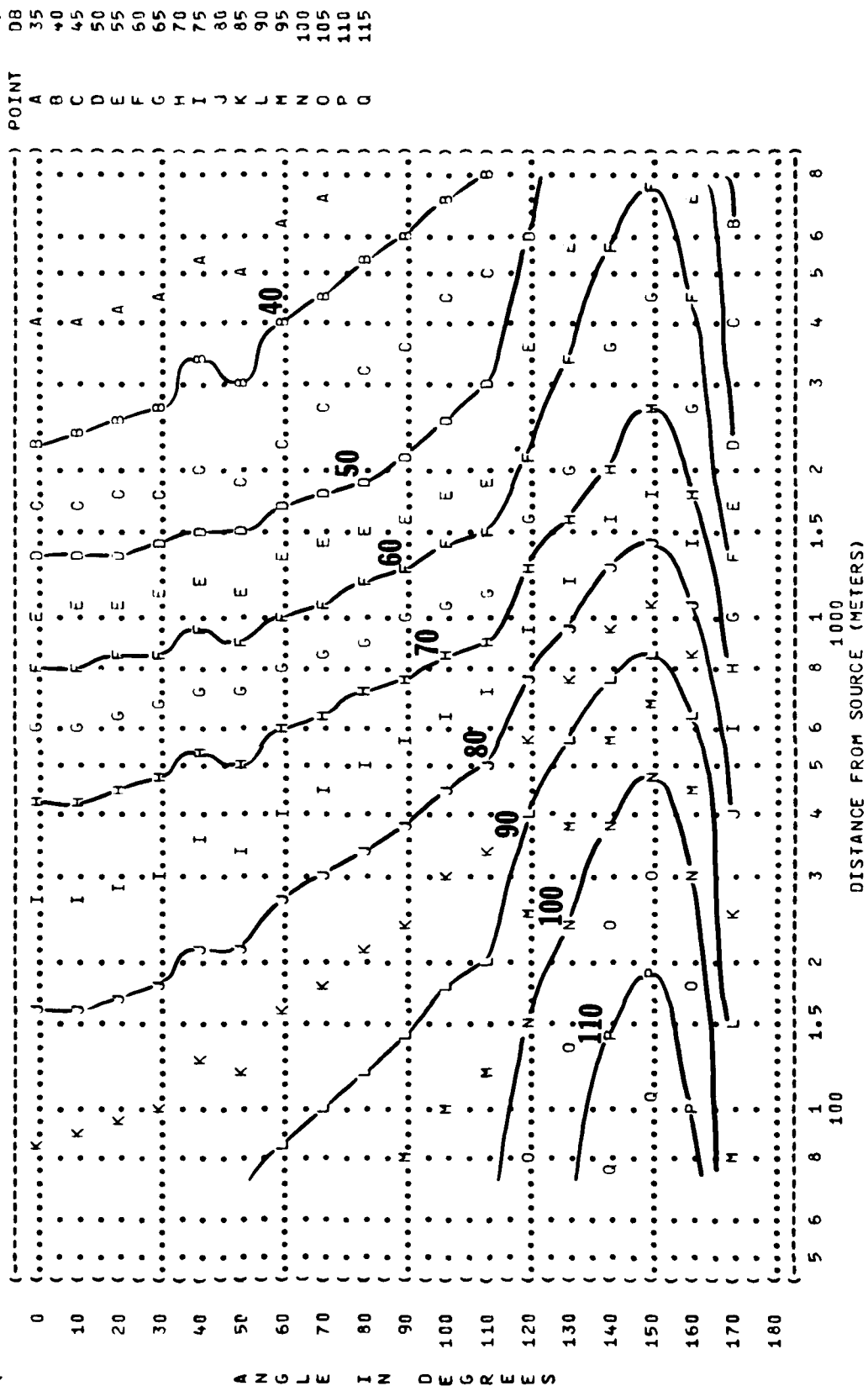
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 (EQUAL LEVEL CONTOURS (DB)
 (11 4000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (POINT DB
 (F-104D AIRCRAFT (IDLE POWER (TEMP = 15 C A 35
 (J79-GE-7/A ENGINE (67% RPM (BAR PRESS = .760 M HG B 40
 (FAR FIELD NOISE (FREE FLOW (REL HUMID = 70 % C 45
 (((((RUN 01 D 50
 (((((TEST 75-002-033 E 55
 (((((PAGE 25 F 60
 (((((G 65
 (((((H 70



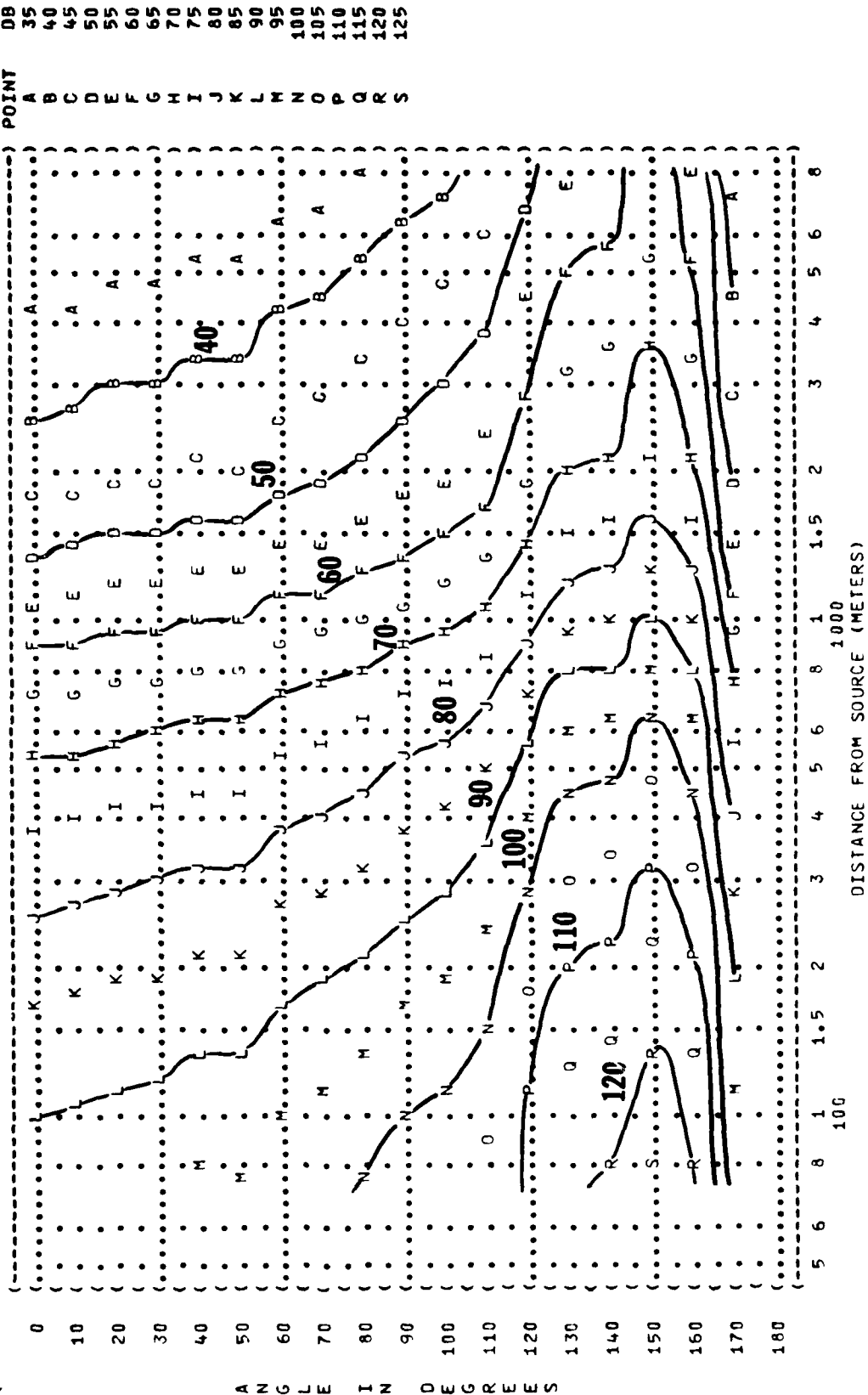
((FIGURE: SOUND PRESSURE LEVEL (SPL)
 ((11 EQUAL LEVEL CONTOURS (CB)
 ((31.5 HZ OCTAVE BAND
 ((NOISE SOURCE/SUBJECT: (OPERATION:
 ((F-104D AIRCRAFT (MILITARY POWER
 ((J79-GE-7/A ENGINE (100% RPM
 ((FAR FIELD NOISE (FREE FLOW
 ((METEOROLOGY:
 ((TEMP = 15 C
 ((BAR PRESS = .760 M HG
 ((REL HUMID = 70 %
 ((IDENTIFICATION:
 ((OMEGA 1.4
 ((TEST 75-002-033
 ((RUN 03
 ((18 SEP 78
 ((PAGE 18



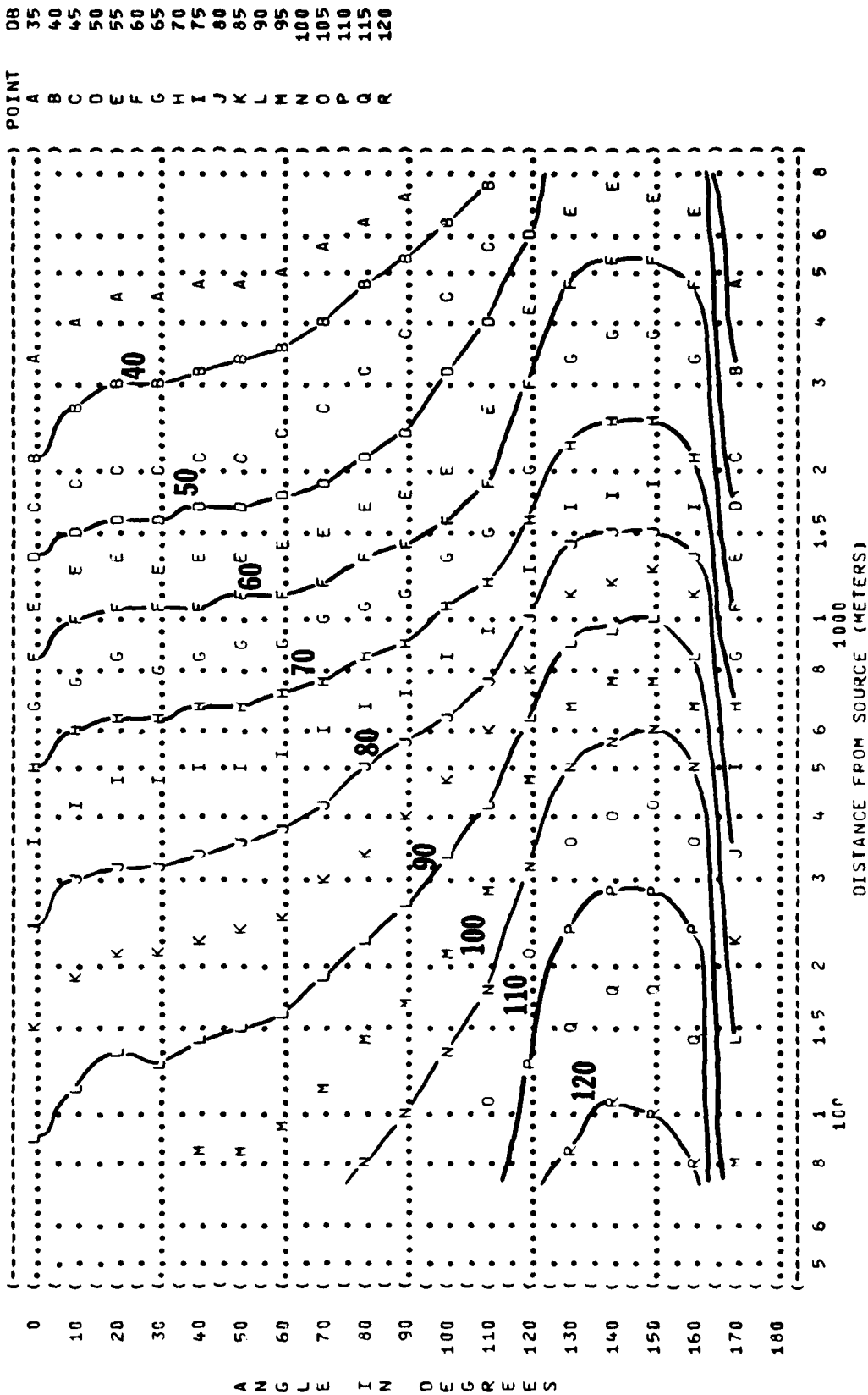
((FIGURE: SOUND PRESSURE LEVEL (SPL)) IDENTIFICATION:)
 ((11 EQUAL LEVEL CONTOURS (CB)))
 ((63 HZ OCTAVE BAND))
 ((NOISE SOURCE/SUBJECT:) OPERATION:) METEOROLOGY:)
 ((F-1040 AIRCRAFT)) TEMP = 15 C)
 ((J79-GE-7/A ENGINE)) MILITARY POWER) BAR PRESS = .760 M HG)
 ((FAR FIELD NOISE)) 100% RPM) REL HUMID = 79 %)
 (()) RUN 03)
 (()) 18 SEP 78)
 (()) PAGE 19)



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (11 125 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (MILITARY POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (FREE FLOW
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-033
 (RUN 03
 (18 SEP 78
 (PAGE 20



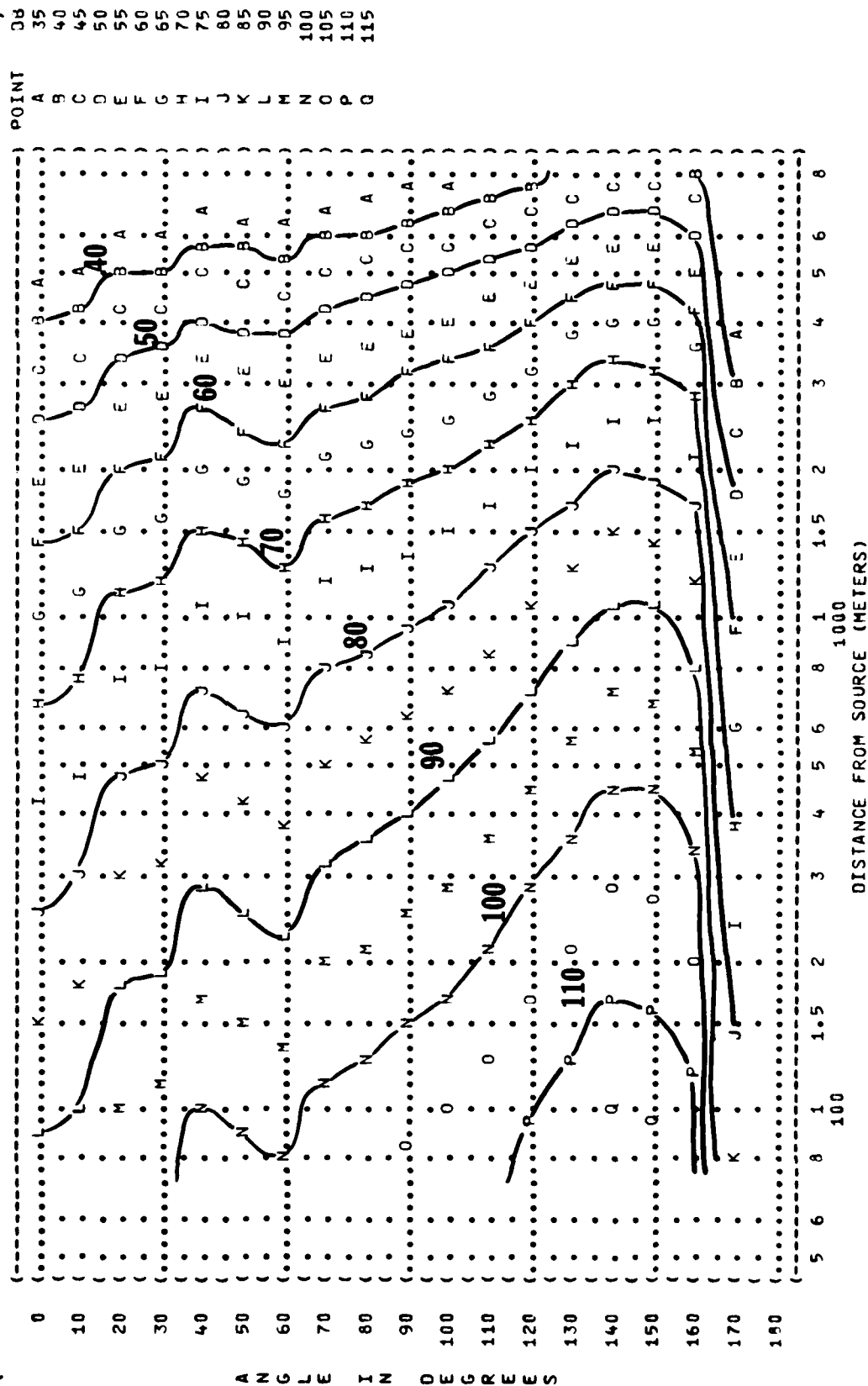
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 (11 EQUAL LEVEL CONTOURS (DB)
 (250 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (MILITARY POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (FREE FLOW
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 21
 (IDENTIFICATION:
 () OMEGA 1.4
 () TEST 75-002-033
 () RUN 03
 () 18 SEP 78




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(-----)
( ( FIGURE: SOUND PRESSURE LEVEL (SPL) ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (FB) ) )
( ( 11 ) )
( ( 1000 HZ OCTAVE BAND ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( ) )
( ( ) ) TEMP = 15 C )
( ( F-104D AIRCRAFT ) ) BAR PRESS = .760 M HG )
( ( J79-GE-7/A ENGINE ) ) REL HUMID = 70 % )
( ( FAR FIELD NOISE ) ) )
( ( ) ) )
(-----)
( ( ) ) PAGE 23 )
(-----)

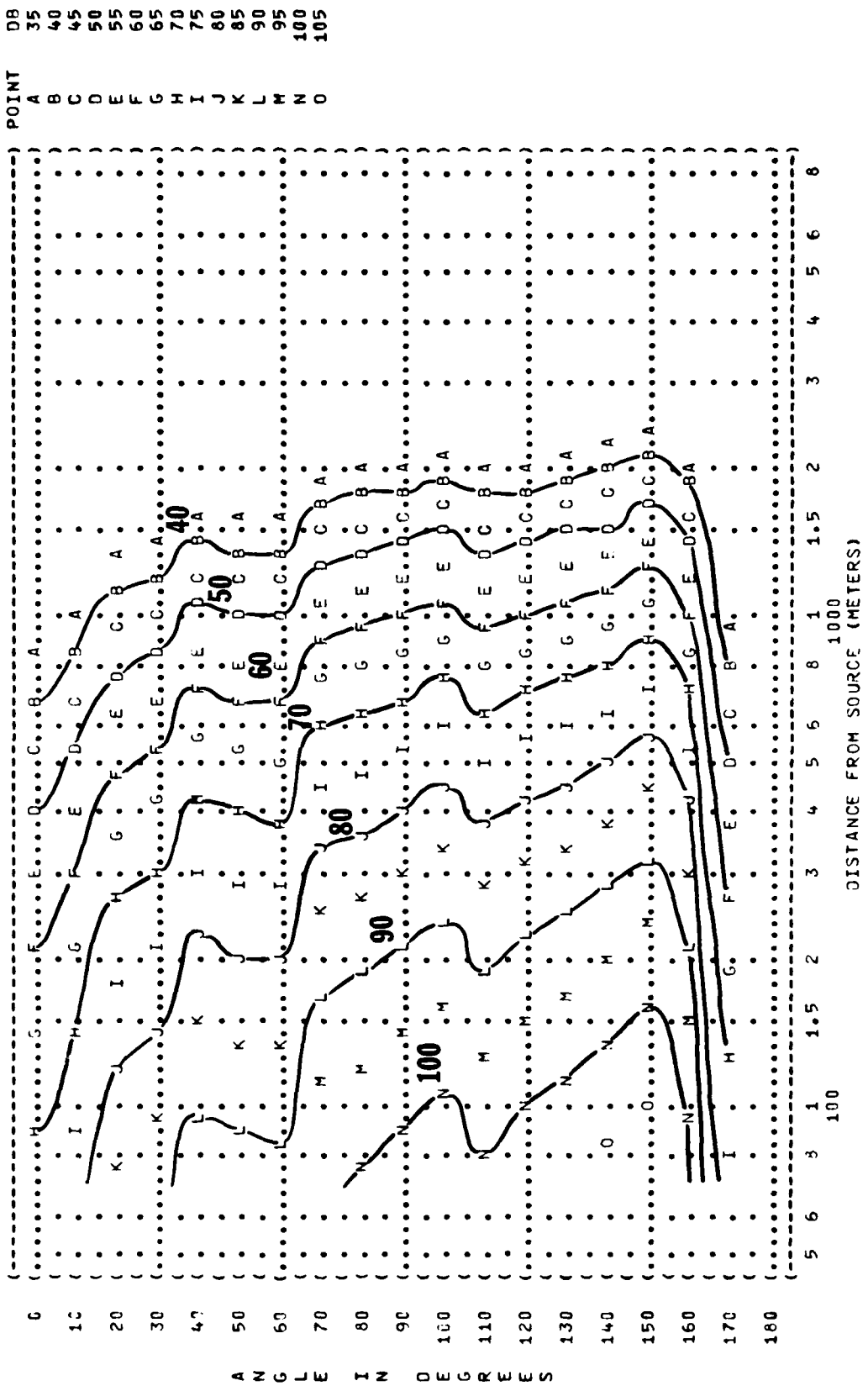
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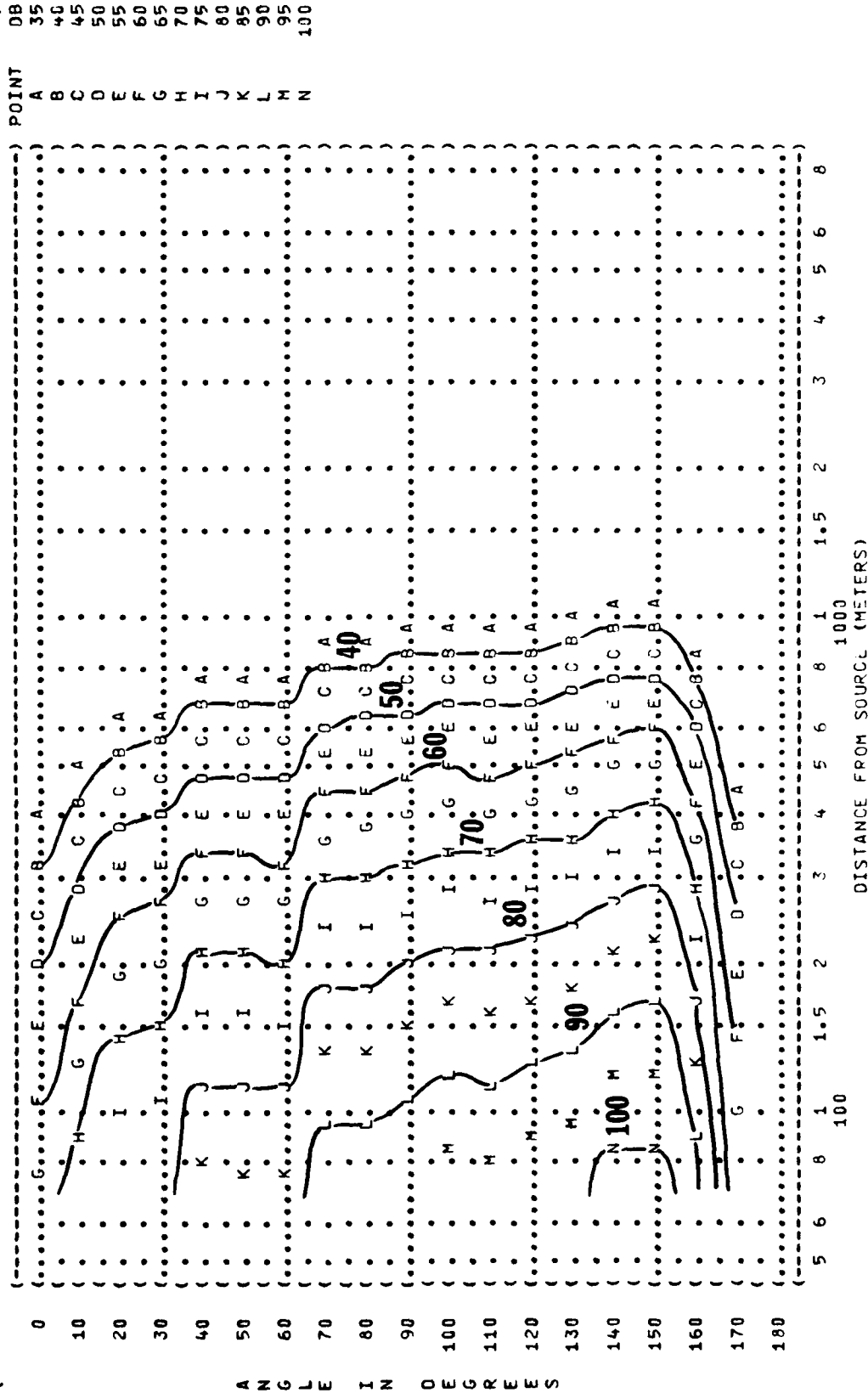
ANGLE IN DEGREES

PAGE 24

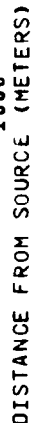
(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (11 EQUAL LEVEL CONTOURS (dB))
 (400 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (F-1040 AIRCRAFT)
 (J79-GE-7/A ENGINE)
 (FAR FIELD NOISE)
 (OPERATION:)
 (MILITARY POWER)
 (100% RPM)
 (FREE FLOW)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 75-002-033)
 (RUN 03)
 (18 SEP 78)
 (PAGE 25)



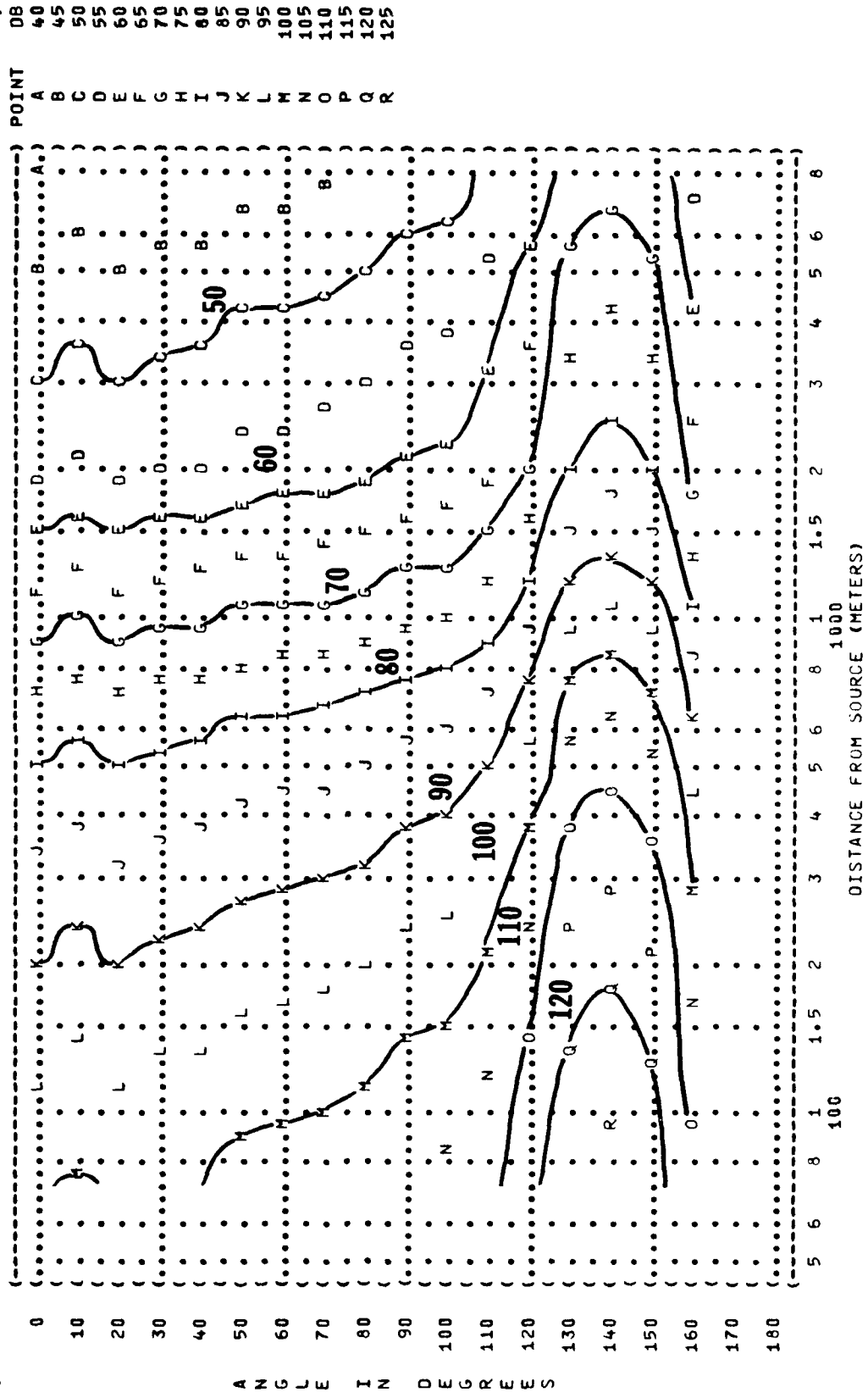
(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (11 EQUAL LEVEL CONTOURS (DB)
 (8000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (MILITARY POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (FREE FLOW
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 H HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-033
 (RUN 03
 (18 SEP 78
 (PAGE 26



POINT	DB
A	50
B	55
C	60
D	65
E	70
F	75
G	80
H	85
I	90
J	95
K	100
L	105
M	110
N	115



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (II EQUAL LEVEL CONTOURS (DB)
 (63 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (TEMP = 15 C
 (F-104D AIRCRAFT (AFTERBURNER POWER (BAR PRESS = .760 M HG
 (J79-GE-7/A ENGINE (100% RPM (REL HUMID = 70 %
 (FAR FIELD NOISE (DEFLECTED FLOW (PAGE 19
 (IDENTIFICATION: (OMEGA 1.4
 (TEST 75-002-060
 (RUN 03
 (24 JAN 79
 ()




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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION:
( EQUAL LEVEL CONTOURS (DB) ) )
( 11 ) OMEGA 1.4
( 125 HZ OCTAVE BAND ) TEST 75-002-060
( NOISE SOURCE/SUBJECT: ) ) RUN 03
( ) METEOROLOGY: )
( ) TEMP = 15 C )
( F-104D AIRCRAFT ) AFTERBURNER POWER ) BAR PRESS = .760 M HG )
( J79-GE-7/A ENGINE ) 100% RPM ) REL HUMID = 70 % )
( FAR FIELD NOISE ) DEFLECTED FLOW ) PAGE 20
(-----)
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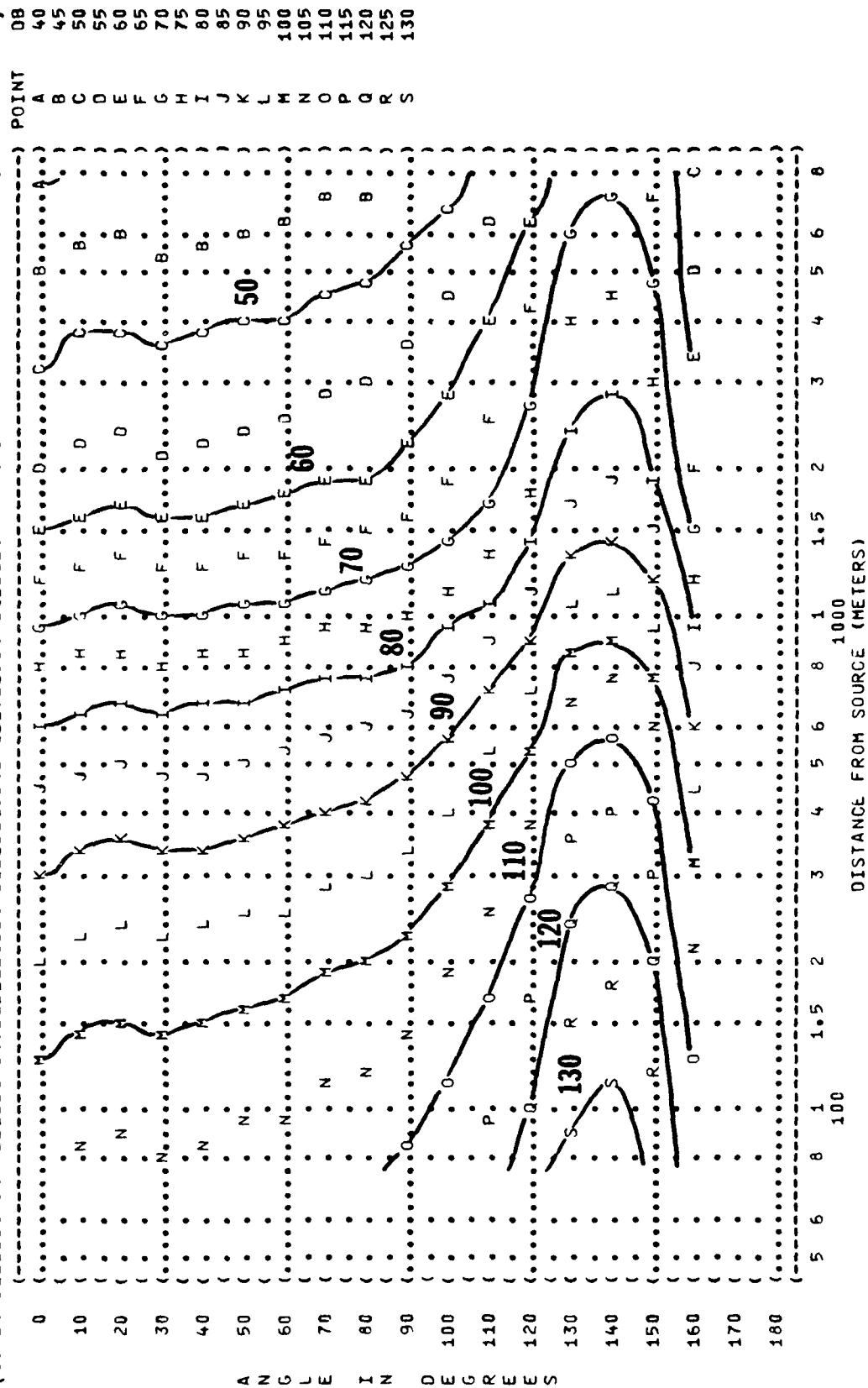
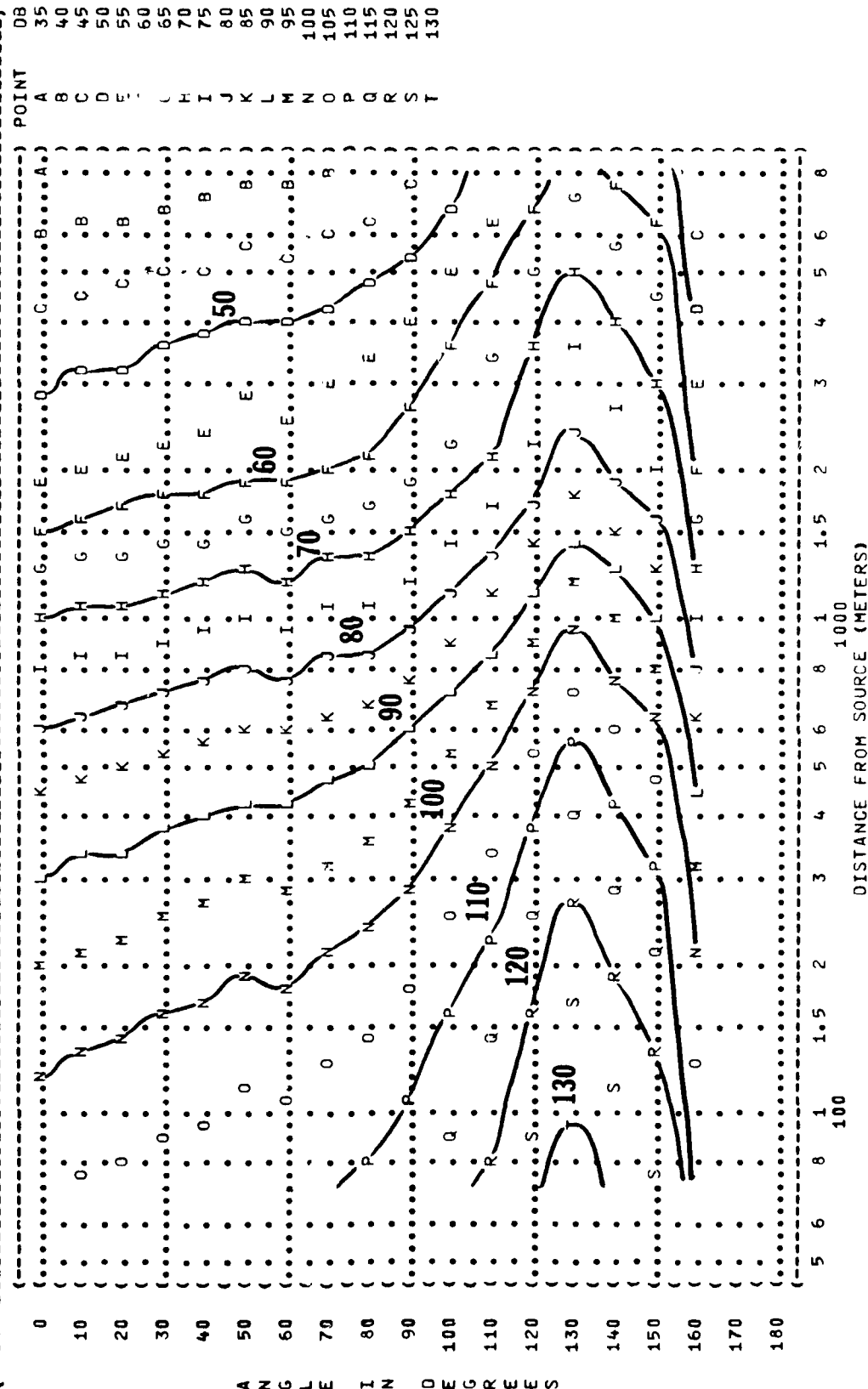
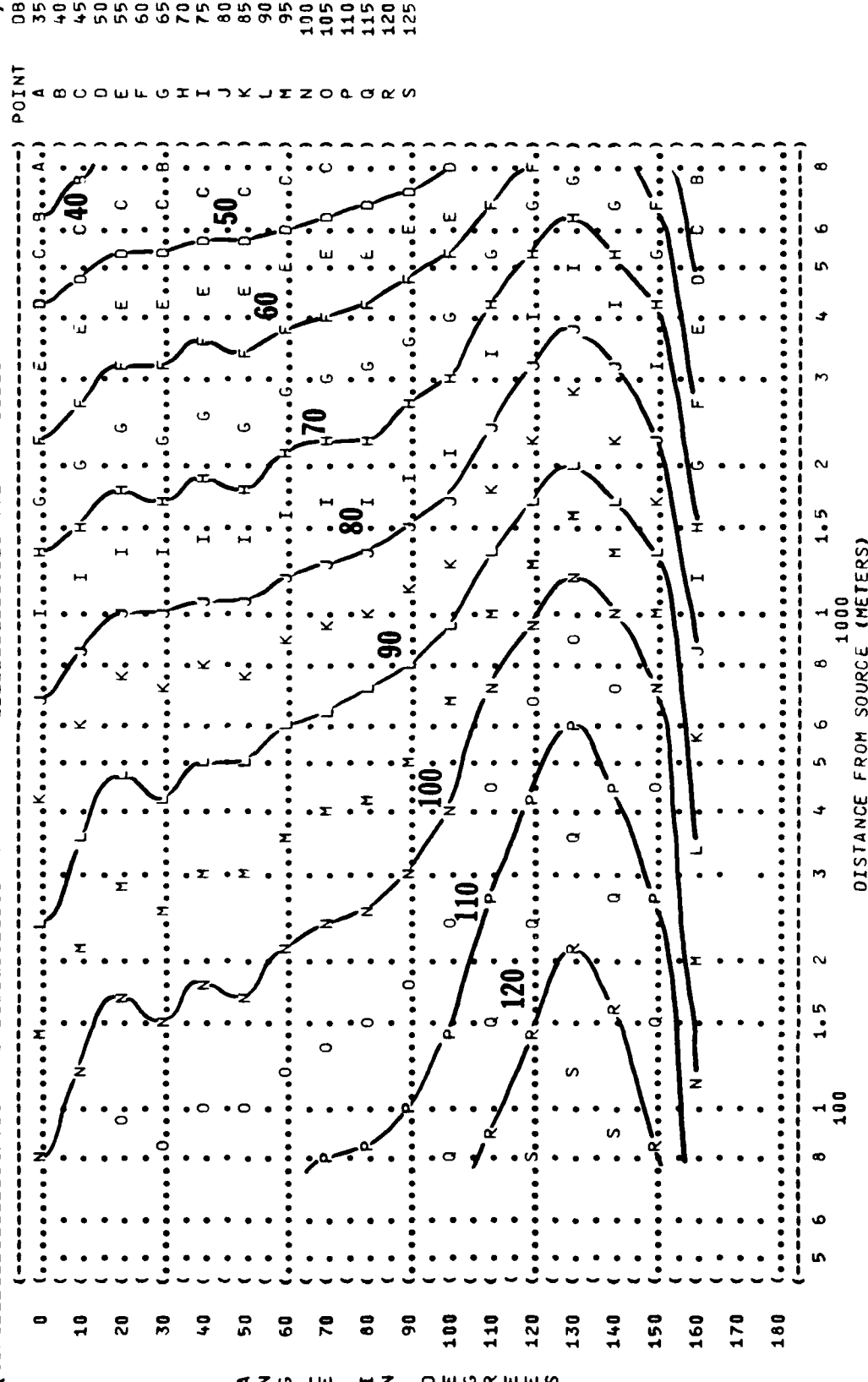


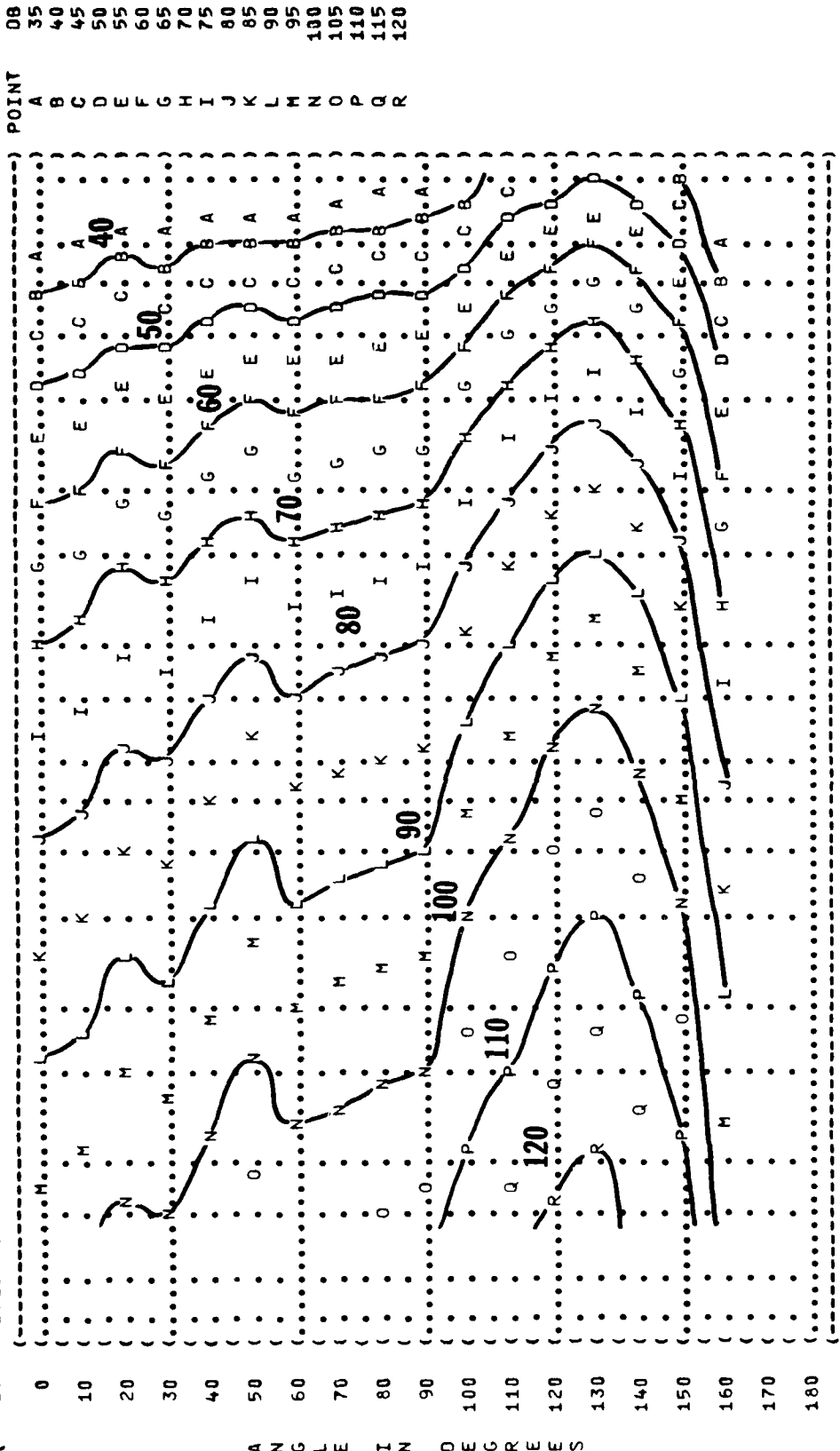
FIGURE #	SOUND PRESSURE LEVEL (SPL)	IDENTIFICATION #
11	EQUAL LEVEL CONTOURS (DB)	
	250 HZ OCTAVE BAND	OMEGA 1.4
		TEST 75-002-060
NOISE SOURCE/SUBJECT:	OPERATION:	RUN 03
		METEOROLOGY:
F-104D AIRCRAFT	AFTERBURNER POWER	TEMP = 15 C
J79-GE-7/A ENGINE	100% RPM	BAR PRESS = .760 M HG
FAR FIELD NOISE	DEFLECTED FLOW	REL HUMID = 70 %
		PAGE 21



(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (11 EQUAL LEVEL CONTOURS (DB))
 (500 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (F-104D AIRCRAFT)
 (J79-GE-7/A ENGINE)
 (FAR FIELD NOISE)
 (OPERATION:)
 (AFTERBURNER POWER)
 (100% RPM)
 (DEFLECTED FLOW)
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 75-002-060)
 (RUN 03)
 (24 JAN 79)
 (PAGE 22)

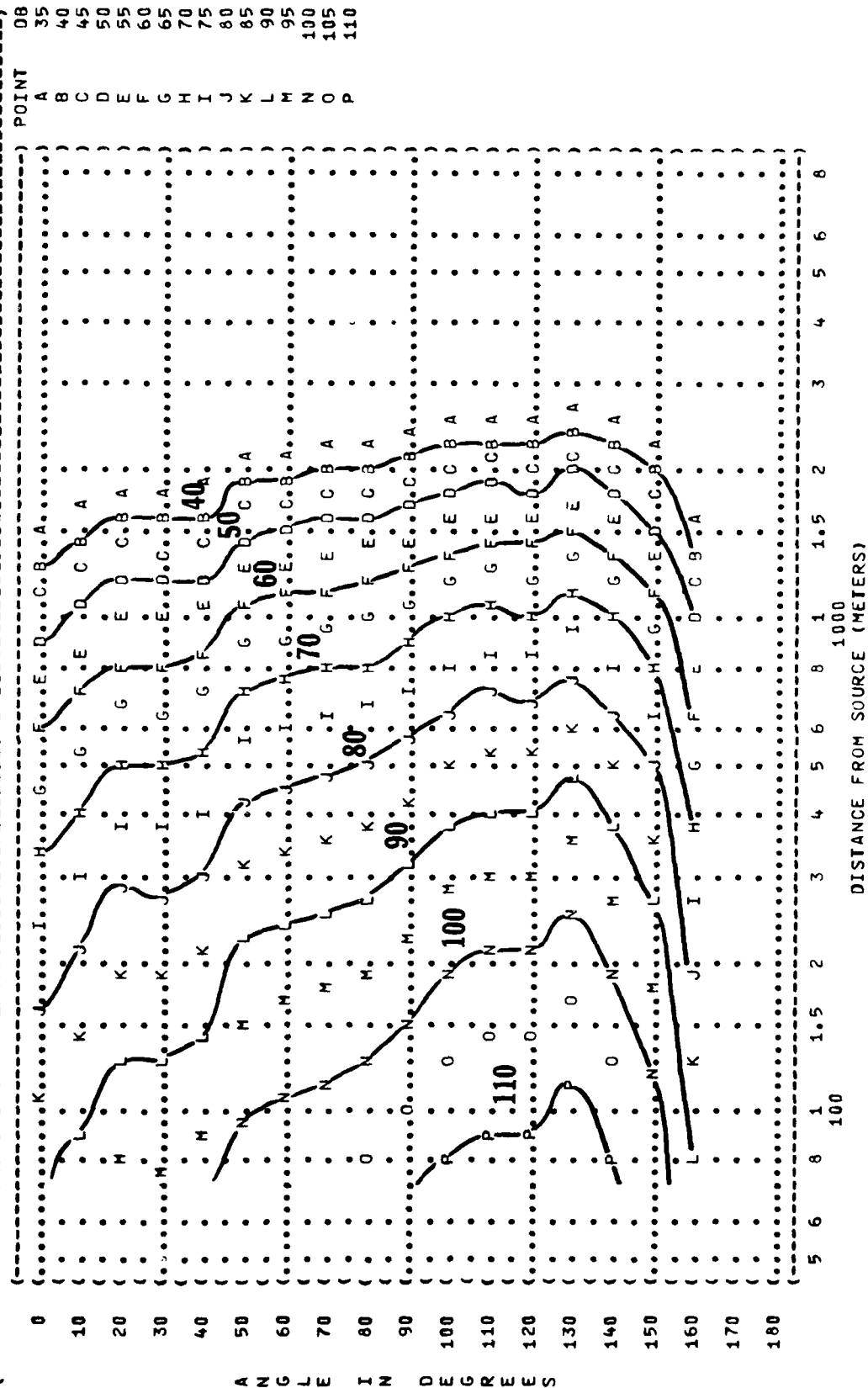


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (11 EQUAL LEVEL CONTOURS (DB)
 (1000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (AFTERBURNER POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (DEFLECTED FLOW
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-060
 (RUN 03
 (24 JAN 79
 (PAGE 23



DISTANCE FROM SOURCE (METERS)

(	(	FIGURE:	SOUND PRESSURE LEVEL {SPL}	)		) IDENTIFICATION:)
(	(	EQUAL LEVEL CONTOURS	(DB))))
(	(	11		)		) OMEGA 1.4)
(	(	4000 HZ OCTAVE BAND		)		) TEST 75-002-060)
(	(	NOISE SOURCE/SUBJECT:	(OPERATION:	) METEOROLOGY:		) RUN 03)
(	(	F-104D AIRCRAFT	(AFTERBURNER POWER	) TEMP = 15 C))
(	(	J79-GE-7/A ENGINE	(100% RPM	) BAR PRESS = .760 M HG		) 24 JAN 79)
(	(	FAR FIELD NOISE	(DEFLECTED FLOW	) REL HUMID = 70 %		) PAGE 25)



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (11 EQUAL LEVEL CONTOURS (DB)
 (8000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-104D AIRCRAFT (AFTERBURNER POWER
 (J79-GE-7/A ENGINE (100% RPM
 (FAR FIELD NOISE (DEFLECTED FLOW
 (METEOROLOGY: TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 75-002-060
 (RUN 03
 (24 JAN 79
 (PAGE 26

